Yahrmarket. h. 1748
M. 2465
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THE

Gentleman's Diary,

OR THE

MATHEMATICAL REPOSITORY;

An ALMANACK

For the YEAR of our LORD 1748.

Being BISSEXTILE or LEAP-YEAR.

Containing many uſeful and entertaining Particulars, peculiarly adapted to the ingenious Gentlemen engaged in the Study and Practice of the

MATHEMATICKS.

The Eighth *Almanack* ever publiſh'd of this Kind

——— Quâ causâ argentea Phœbe
Paſſibus haud æquis graditur; cur ſubdita nulli
Hactenus Aſtronomo numerorum frœna recuſat:
Cur remeant Nodi, curque Auges progrediuntur.
——— Quantis refluum vaga Cynthia pontum
Viribus impellit; dum fractis fluctibus ulvam
Deſerit, ac Nautis ſuſpectas nudat arenas,
Alternis vicibus ſuprema ad littora pulſans.

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M DCC XLVIII.

Juſt Publiſhed, Price Three Shillings,

A

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OF THE

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From an accurate Survey of the ſame.

By JOHN BADDER and THOMAS PEAT.

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JANU-

JANUARY hath xxxi Days.

M D	Day Breaks.	Sun's Decl.
6	5 51	20 50
12	5 44	19 32
18	5 36	18 2
24	5 27	16 19
31	5 16	14 8

Full Moon 4 Day at 5 at Night
Last Quarter 12 Day at Noon
New Moon 19 Day at 3 in the Morning
First Quarter 26 Day at 7 in the Morning

1	F	Circumcision. New Years Day	arms	6	M 6	9	46
2	S	*The New-year is likely to beg. with*	shou.	6	59	10	37
3	C	2 Sunday after Christmas	brea.	7	41	11	25
4	M	*Cold Winds and per. some Sleets.*	stom	Rises		Morn.	
5	T	Days Inc. and Nights short. 33 m.	heart	4	N 50	0	14
6	W	Epiph. or Ch. Appear. to Gent.	and	6	7	1	1
7	T	Days 8 hours long	back	7	23	1	46
8	F	Notting. Epiph. Fair is al-	bow	8	35	2	25
9	S	ways the 1st Fr. aft. Jan. 2.	belly	9	55	3	5
10	C	1 Sunday after Epiphany	reins	11	12	3	50
11	M	*Now more fair and pleas. for the S.*	loins	Morn.		4	35
12	T	Day 8 hours 14 min. long	secr.	0	31	5	20
13	W	Cam. T. beg. Hilary. Mar.	blad.	1	59	6	3
14	T	Oxford T. beg. [comes in	thig.	3	25	7	7
15	F	*Cold Frost and Snow*	hips	4	55	8	10
16	S	*a right Winterly Season.*	kne.	6	1	9	14
17	C	2 Sunday after Epiphany	ham.	6	55	10	23
18	M	Days 8 hours 34 min. long.	legs	7	30	11	23
19	T	☉ Eclip. invis.	and	Sets		0 A	20
20	W	Pr. of W. b. Octab. Hil. 1. Ret.	ank.	6	N 35	1	14
21	T	Agnes.	feet	8	4	2	2
22	F	*Fair and Frosty*	toes	9	29	2	49
23	S	Hillary Term begins	head	10	47	3	35
24		3 S. aft. Epiphany	face	Morn.		4	19
25	M	St. Paul's Conversion	neck	0	8	5	7
26	T	Day 9 hours 8 min. long	thro	1	24	5	53
27	W	Quind. Hill. 2 Ret.	arms	2	41	6	43
28	T	*Cold Winds and perhaps some Sleet*	and	3	51	7	33
29	F	*or Showers towards the End*	shou.	4	46	8	23
30	S	K. C. I. m. at W. H. 12 m. p. 1.	brea.	5	33	9	15
31		4 Sunday after Epiph. [1648-9.	stom	6	9	10	5

M D	Sun Rises.	Sun Sets.	Saturn Rises.	Jupiter Rises.	Mars Sets.	Venus Sets.	Mercu. Rises	Watch t... st.
6	8 1	3 59	1 M 37	8 M 12	8 N 29	5 N 40	6 M 43	10 35
12	7 53	4 7	1 10	7 52	8 30	5 59	7 1	12 21
18	7 43	4 17	0 48	7 31	8 32	6 19	7 10	13 40
24	7 32	4 28	0 25	7 10	8 34	6 39	7 17	14 29
31	7 19	4 41	11 N 54	6 46	8 36	7 1	7 14	14 42

FEBRUARY hath xxix Days.

M D	Day Breaks.	Sun's Declin.
Full Moon the 3 Day at Noon,	6 5 3	12 8 6
Last Quarter 10 Day at 9 at Night	12 4 53	9 58
New Moon 17 Day at 3 Afternoon	18 4 41	7 42
First Quarter 25 Day at 3 in the Morning	24 4 28	5 24
	29 4 18	3 2[illegible]

M D.	W D.	Sundays, Holy-days, remarkable Days, Length, Inc. and Dec. of Days, Terms, Weather, &c.	☽'s sign.	Moon's Ris. and Setting	Moon's South-ing.
1	M	*Still expect Cold Frosty*	heart	6 M 32	10 N 52
2	T	Purification, or Candlemas Day	and	6 45	11 38
3	W	Craſt. Purif. 3 Ret. ☽ Ecl. inv.	back	Riſes	Morn.
4	T	*and winterly weather; or what you*	bow	6 N 21	0 20
5	F	*may call, a Candlemas-blaſt.*	belly	7 42	1 1
6	S	Days 9 hours 47 min. long	reins	8 57	1 46
7	☾	Septuageſima Sunday	and	10 18	2 30
8	M	**Marriage goes out**	loins	11 48	3 17
9	T	Sun's Amplitude 18°, 28′ South	ſecr.	Morn.	4 6
10	W	Octab. Purif. 4 Return	blad.	1 8	5 1
11	T	Days increas'd 2 hours 54 min.	hips	2 32	5 58
12	F	Term ends	thig.	3 49	7 1
13	S	*Foggy and perhaps ſome Sleet*	knee	4 47	8 7
14	☽	Sexageſima Sun. **Valentine.**	ham.	5 27	9 6
15	M	*About this Time*	legs	5 50	10 6
16	T	*expect Plenty of Snow,*	ankl.	6 10	11 1
17	W	*or cold Rains,*	feet	Sets	11 51
18	T	Days 10 hours 38 min. long and	toes	6 N 17	0 A 37
19	F	*with boiſterous Winds.*	head	8 20	1 26
20	S	Night 13 hours 22 min. long	face	9 42	2 12
21	☾	Quinquageſima Sunday	neck	11 4	2 59
22	M	Princeſs of Hesse born	and	Morn.	3 48
23	T	Shrove Tueſday	thro.	0 24	4 38
24	W	Aſh Wedneſ. St. Matthias	arms	1 42	5 28
25	T	Nights now ſhorten'd 3h. 45m.	ſho.	2 43	6 20
26	F	*Now, and towards the end, expect*	brea.	3 33	7 11
27	S	*more favourable & pleaſ. Weather.*	and	4 11	8 0
28		1 Sun. in Lent Quadrageſima	ſto.	4 39	8 17
29	M	Mr. *Atkinſon's* Sweet-h's. B. Day	heart	5 0	9 36

M D	Sun Riſes.	Sun Sets.	Saturn Riſes.	Jupiter Riſes.	Mars Sets.	Venus Sets	Mercu. Sets	Watch too faſt.
6	7 7	4 53	11 N 30	6 M 25	8 N 39	7 N 21	4 N 24	14 35
12	6 55	5 6	11 5	5 58	8 42	7 41	5 6	13 55
18	6 42	5 19	10 42	5 37	8 45	8 2	5 54	12 53
24	6 30	5 31	10 19	5 17	8 49	8 23	6 42	11 32
[illegible]	6 [illegible]	5 [illegible]	10 [illegible]	5 0	8 52	8 42	7 19	10 14

MARCH hath xxxi Days.

M D	Day Breaks.	Sun's Declin.
6	4 3	1 S 8
12	3 50	1 N 17
18	3 36	3 38
24	3 17	5 3
31	3 7	8 38

Full Moon 4 Day at 4 in the Morning.
Last Quarter 11 Day at 5 in the Morn.
New Moon 18 Day at 3 in Morn.
First Quarter 25 Day at 11 at Night.

1	T	David	*Now* March *Winds*	back	5	M 15	10	N 16
2	W	Chad B.	Ember Week	bow	5	46	11	3
3	T	☉ rising Amplitude 3°. 38′ South		and	6	11	11	48
4	F	*with pretty much Sleet,*		belly	Rises		Morn.	
5	S	*or cold Rains,*		reins	8	N 4	0	30
6	B	2 Sunday in Lent. Reminiscere		loins	9	34	1	19
7	M	*Hail or Snow.*		secr.	11	0	2	7
8	T	Equal Day and Night, in all		blad.	Morn.		3	0
9	W	At 5h. 28 m. AM. ☉ enters ♈.		hips	0	28	4	0
10	T	the habitable Parts of the Earth		thig.	1	45	5	1
11	F	*Still much downfall*		kne.	2	46	6	2
12	S	*and rough* March *Winds.*		bam	3	30	7	6
13	B	3 Sunday in Lent. Oculi		legs	4	0	8	5
14	M	Prince EDWARD born		ankl.	4	22	9	0
15	T	☉ due E. 6h. 7′. his Alt. 2°. 57′.		feet	4	37	9	49
16	W	*Now more calm and favourable*		toes	4	51	10	38
17	T	Days increased 5 ho. 21 min.		*born*	5	4	11	23
18	F	*Weather may be expected.*		head	Sets		0	A 12
19	S	☉ Amplitude 7° North		face	8	N 47	0	58
20	B	4 Sund. in Lent. Mid Lent Sun		neck	10	8	1	47
21	M	☉ due E. 6h. 14m. Alt. 5°. 52′.		thro.	11	26	2	36
22	T	*Some moderate Frosts,*		arms	Morn.		3	29
23	W	*and pretty fair*		and	0	31	4	20
24	T	Days 13 ho. 4 min. long		sho.	1	30	5	11
25	F	Ann. of V. Mar. or LADY DAY		brea.	2	14	6	2
26	S	*and favourable*		stom	2	47	6	52
27	B	5 Sunday in Lent. Judica		heart	3	10	7	38
28	M	Day 13 ho. 20 min. long		and	3	28	8	21
29	T	*for Seed Time*		back	3	42	9	4
30	W	*to the end.*		bow	3	55	9	52
31	T	Days incr. & N. short. 6h. 1 q.		belly	4	5	10	34

M D	Sun Rises.	Sun Sets.	Saturn Rises.	Jupiter Rises.	Mars Sets.	Venus Sets.	Mercu. Sets.	Watch too fast.
6	6 6	5 55	9 N 37	4 M 51	8 N 57	9 N 3	7 N 48	8 31
12	5 53	6 8	9. 13	4 32	9 2	9 26	7 55	6 41
18	5 41	6 20	8 50	4 14	9 5	9 48	7 34	4 48
24	5 29	6 32	8 26	3 54	9 8	10 9	Rises	2 58
31	5 15	6 46	7 59	3 31	9 13	10 35	4 M 53	0 57

APRIL hath xxx Days.

	M D	Day Break.	Sun's Decl.
Full Moon 2 Day at 4 in the Afternoon	6	2 38	10 N 42
Last Quarter 9 Day at 11 in the Morning	12	2 16	12 44
New Moon 16 Day at 4 in the Afternoon	18	1 55	14 40
First Quarter 24 Day at 6 in the Afternoon	24	1 29	16 26
	30	0 48	18 3

1	F	Cam. Term ends	reins	4 M	16	11	21
2	S	Oxford Term ends	loins	☽ Rises		Morn.	
3	B	6 Sunday in Lent. Palm Sund.	secr.	8 N	5	0	9
4	M	*This Month is likely to begin*	blad.	10	15	1	3
5	T	*with windy and wet Weather.*	hips	11	40	2	0
6	W	Days 13 hours 58 min. and	thig.	Morn.		3	1
7	T	Night 10 h. 2 min. long.	knee	0	52	4	3
8	F	Good Frid. Our Sav. Crucif	ham	1	40	5	6
9	S	*Frequent Showers about this Time*	legs	2	13	6	7
10	B	Easter Day. Our Sav. Ref	and	2	34	7	3
11	M	Easter Monday	ankl.	2	50	7	54
12	T	Easter Tuesday	feet	3	5	8	42
13	W	Day increas'd 7 h. 6 min.	toes	3	19	9	25
14	T	☉ due E. 6h. 41m. Alt. 16°. 42′.	head	3	30	10	12
15	F	Prince William born	face	3	43	10	57
16	S	*Still perhaps Wet and Windy.*	neck	☽ Sets		11	45
17	B	1 Sund. after Easter; Low Sund	thro.	9 N	11	0 A	34
18	M	Marriage comes in	arms	10	24	1	26
19	T	*but not at all unseasonable.*	and	11	27	2	18
20	W	Dr. and Cam. Terms begin	sho.	Morn.		3	9
21	T	☉ rising Amp. 26° 19′ North	brea.	0	15	4	0
22	F	*More fair and pleasant*	stom	0	50	4	49
23	S	St. George	heart	1	19	5	34
24	B	2 Sund. after Easter. Misericordia	and	1	39	6	20
25	M	St. Mark the Ev. Qu.	back	1	52	7	3
26	T	*Expect some fruitful Showers*	bow	2	6	7	45
27	W	Term begins	belly	2	17	8	28
28	T	*and fine springing Weather*	reins	2	30	9	12
29	F	*to the End.*	and	2	41	10	2
30	S	Days increased 8 h. 9 m.	loins	2	54	10	54

M D	Sun Rises.	Sun Sets.	Saturn South.	Jupiter Rises.	Mars Sets.	Venus Sets.	Mercu. Rises.	Watch too slow.
0	5 2	6 59	12 N 34	3 M 12	9 N 15	10 N 54	4 M 37	0 35
12	4 51	7 10	12 10	2 52	9 18	11 13	4 25	1 54
18	4 39	7 22	11 46	2 31	9 20	11 27	4 13	2 55
24	4 28	7 33	11 21	2 9	9 21	11 37	4 1	3 37
30	4 18	7 43	10 55	1 47	9 21	11 44	5 50	4 0

MAY hath xxxi Days.

M D	Day Breaks	Sun's Decl.
6		19 N28
12	No	20 42
18	real	21 44
24	Night.	22 32
31		23 10

Full Moon the 2 Day at 2 in the Morning
Last Quarter the 8 Day at 5 in the Afternoon
New Moon the 16 Day at 5 in the Morning.
First Quarter the 24 Day at 10 in the Morning.
Full Moon 31 Day at 9 in the Morning.

1	B	3 S.aft. E. St. PH. and JA. Jub.	fecr.	3 M 10	11 N48
2	M	Tres Pascn. 2 Return	blad.	Rises	Morn.
3	T	*Windy, and show'ry Weather,*	hips	10 33	0 50
4	W	*may well be expected*	thig.	11 35	1 56
5	T	*at the beginning of this*	kne.	Morn.	3 0
6	F	*Month, but not very cold.*	ham	0 16	4 4
7	S	☉ampl. 34° 15′ North	legs	0 43	5 0
8	B	4 Sunday after Easter,	ankl.	1 0	5 53
9	M	Mens. Pas. 3 Ret. West. Elec.	feet	1 16	6 43
10	T	☉ due E. 7 Morn. Alt. 25°.28′.	toes	1 28	7 28
11	W	*Not much Alteration*	head	1 39	8 14
12	T	*for the present,*	face	1 51	8 57
13	F	*but still show'ry*	neck	2 5	9 42
14	S	Marriage goes out	thro.	2 21	10 32
15	B	5 Sun. after Easter, Rogat. S.	arms	2 42	11 20
16	M	Quin. Pasch. 4 Return.	and	☽ Sets	0 A11
17	T	*and perhaps some Claps of Thun.*	sho.	10 11	1 0
18	W	Day 16 ho. and 1 quarter long	brea.	10 50	1 52
19	T	Holy Thursday, CHR. Ascen.	and	11 20	2 43
20	F	*Brisk Winds, and not so much*	stom	11 42	3 30
21	S	*inclined to wet.*	heart	11 57	4 15
22	B	6 Sunday after Easter, Exaudi	back	Morn.	4 59
23	M	Term Ends	bow	0 12	5 41
24	T	Prince GEORGE born	and	0 21	6 20
25	W	☉ rising Ampl. 39°. 50′.	belly	0 31	7 2
26	T	Dr. and Cam. Terms end	reins	0 44	7 49
27	F	*Now, and to the end more Showers,*	loins	0 54	8 37
28	S	*and probably some Thunder.*	secr.	1 10	9 30
29	B	Whit-Sunday. K. Ch. II. Rest.	blad.	1 31	10 28
30	M	Prs. AM. & CAR. b. Whit. Mo.	hips	2 0	11 32
31	T	Whit. Tuesday.	thig.	2 52	12 38

M D	Sun Rises.	Sun Sets.	Saturn South.	Jupiter Rises.	Mars Sets.	Venus Sets.	Mercu. Rises.	Watch too slow
6	4 8	7 53	10 N30	1M 23	9 N 18	11 N48	3 M36	4 1
12	4 0	8 1	10 4	1 0	9 16	11 46	3 28	3 43
18	3 52	8 9	9 39	0 37	9 12	11 41	3 24	3 6
24	3 47	8 14	9 13	0 13	9 7	11 31	3 28	2 12
31	3 41	8 2	8 43	11N 38	8 58	11 17	3 46	0 54

JUNE hath xxx Days.

	M D	Day break.	Sun's Decl.
Laſt Quarter 7 Day at 1 in the Morning	6		23 N 26
New Moon 14 Day at 8 at Night	12	No	23 28
Firſt Quarter 22 Day at 10 at Night.	18	real	23 15
Full Moon 29 Day at 4 in the Afternoon	24	Night.	22 47
	30		22 5

1	W	Ember Week Day 16h. 40min.	kne.	10	N 8		0 M	38
2	T	*Warm and fine Summer's Weather,*	ham	10	42		1	44
3	F	*but perhaps a Shower and ſome*	legs	11	2		2	46
4	S	*cooling Breezes.*	ankl.	11	18		3	42
5	B	Trinity Sund. Marr. comes in	feet	11	31		4	32
6	M	Craſ. Tr. 1 ret. Cr. Col. Elect.	toes	11	44		5	21
7	T	The greateaſt increaſe of Days	*corn*	11	55		6	6
8	W	Dr. and Cambr. Terms begin	head	Morn.			6	50
9	T	at LONDON is 8h. 59 min.	face	0	7		7	38
10	F	T. beg. ☉ in ♋ 10h. 40m. a.m.	neck	0	25		8	28
11	S	St. Barnab. K. GEORGE II. Ina.	thro.	0	43		9	12
12	B	1 Sunday after Trinity	arms	1	8		10	1
13	M	Octab. Trin. 2 Return	ſho.	1	44		10	53
14	T	The greateſt lengthening at	brea.	Sets			11	45
15	W	K. GEORGE II. proclaimed	and	9	N 19		0 A	33
16	T	NOTTINGH. is 9 h. 24 min.	ſtom	9	43		1	22
17	F	*Windy, and perhaps inclined*	heart	9	58		2	7
18	S	*to wet about this Time.*	back	10	11		2	48
19	B	2 Sunday after Trinity	bow	10	24		3	31
20	M	Quind. Trin. 3 return	belly	10	35		4	11
21	T	☉ due E. 7h. 15′. Alt. 29°. 28′.	reins	10	45		4	53
22	W	*Now more fair, and hot,*	and	10	55		5	35
23	T	*and perhaps ſome Claps of*	loin.	11	8		6	19
24	F	St. John Bapt. Midſum. Day	ſecr.	11	26		7	10
25	S	S. John's C. Dr. Election	blad.	11	52		8	4
26	B	3 Sunday after Trinity	hips	Morn.			9	4
27	M	Treſ. Trin. 4 return	thig.	0	27		10	11
28	T	*Thunder towards the End.*	kne.	1	30		11	13
29	W	St. Pet. and St. Paul. Term ends	ham	Riſes			Morn.	
30	T	Exeter College Election	legs	9	N 0		0	19

M D	Sun Riſes.	Sun Sets.	Saturn Sets.	Jupiter Riſes.	Mars Sets.	Venus Riſes.	Mercu. Sets.	Watch too faſt.
6	3 39	8 21	1 M 27	11 N 18	8 N 52	11 N 0	9 N 27	0 20
12	3 39	8 21	1 1	10 51	8 45	10 44	9 40	1 37
18	3 40	8 20	0 36	10 27	8 35	10 25	9 44	2 53
24	3 44	8 16	0 11	10 2	8 26	10 4	9 36	3 59
30	3 49	8 11	11 N 44	9 57	8 16	9 40	9 21	4 53

JULY hath xxxi Days.

M D	Day Breaks.	Sun's Declin.
6	No real	21 N 10
12	Night.	20 0
18	0 21	18 40
24	1 15	17 10
31	1 44	15 9

Last Quarter 6 Day at 10 in the Morn.
New Moon 14 Day at 11 in the Morning
First Quarter 21 Day at 8 in the Morn.
Full Moon 28 Day at 12 at Night

1	F	*Some flying Showers, and brisk*	ankl.	9 N	18	1 M	20
2	S	*Gales of Wind at the Beginning.*	feet	9	34	2	14
3	B	4 Sunday after Trinity	toes	9	47	3	7
4	M	☉ Due E. 7 h. 9 m. Al. 27° 20′	*corn*	9	57	3	57
5	T	Cambridge Commencement	head	10	9	4	44
6	W	Days now decreased 37 min.	face	10	25	5	39
7	T	Tho. a Becket.	neck	10	44	6	17
8	F	Camb. Term ends.	thro.	11	8	7	5
9	S	☉ Amplitude 35° 56′ North.	arms	11	38	7	55
10	B	5 Sunday after Trinity	and	Morn.		8	46
11	M	*Expect Wind, and perhaps some*	sho.	0	17	9	38
12	T	*sudden Showers and Claps of*	brea.	1	24	10	27
13	W	*Thunder.*	stom	2	30	11	16
14	T	☉ eclipsed visible	heart	☽ Sets		0 A	2
15	F	☽ within	and	8 N	17	0	46
16	S	☉ rise and set. Ampl. 33° 10′	back	8	29	1	28
17	B	6 Sunday after Trinity	bow	8	40	2	9
18	M	Days decreas'd and Nights	belly	8	50	2	50
19	T	Dog-days begin	reins	9	0	3	30
20	W	lengthen'd 1 h. and 8 min.	and	9	14	4	11
21	T	*Thunder and sudden Storms.*	loins	9	30	5	2
22	F	Mary Magdalen	secr.	9	50	5	54
23	S	☉ due E 6h. 55 m. Alt. 22° 4′	*priv.*	10	24	6	48
24	B	7 Sun. af. Trin. Mag. Col.	hips	11	10	7	52
25	M	St. James the Ap. [Dr. Elect.	thig.	Morn.		8	56
26	T	☽ Ampl. 28 deg. 31 min.	kne.	0	15	10	0
27	W	*Sultry, with Thunder,*	ham	1	35	11	0
28	T	Moon's Eclipse visible	legs	3	12	12	0
29	F	*and inclin'd to Wet.*	ank	☽ Rises		Morn.	
30	S	Days decreased 1 hour 54 min.	feet.	7 N	53	0	55
31	B	8 Sun. aft. Trin. Pr. Auc. b.	toes	8	10	1	45

M D	Sun Rises.	Sun Sets.	Saturn Sets.	Jupiter Rises.	Mars Rises.	Venus Sets.	Mercu. Sets.	Watch too fast
6	3 56	8 4	11 N 21	9 N 11	3 M 32	9 N 14	9 N 0	5 33
12	4 3	7 57	10 56	8 46	3 30	8 45	8 34	5 55
18	4 12	7 47	10 33	8 20	3 28	8 14	8 5	5 53
24	4 22	7 37	10 9	7 56	3 26	7 41	7 33	5 32
31	4 35	7 24	9 42	7 27	9 25	7 06	6 55	4 40

AUGUST hath xxxi Days.

M D	Day Breaks.	Sun's Decl.
Last Quarter 4 Day at 10 at Night	6 2 9	13 N 18
New Moon 13 Day at 3 in Morning	12 2 29	11 19
First Quarter 20 Day at 4 Afternoon	18 2 50	9 12
Full Moon 27 Day at 8 Morning	24 3 8	7 0
	31 3 26	4 22

1	M	Lammas Day	head	8	N 19	2	M	33
2	T	*Now perhaps foggy*	face	8	36	3		21
3	W	*or ſmall Rains,*	neck	8	52	4		12
4	T	*and not very good*	thro	9	16	5		2
5	F	*Weather for the Harveſt*	arms	9	43	5		52
6	S	Days 14 hours 27 min. long	and	10	27	6		44
7	B	9 Sunday after Trinity	ſho.	11	21	7		33
8	M	☉ due Eaſt 6h. 36′. Alt. 15° 10′	brea	Morn.		8		24
9	T	☉ Amplitude 18° 28′ North	ſtom	0	23	9		14
10	W	Laurence	heart	1	35	10		0
11	T	Days are now decreaſed, and	and	2	45	10		47
12	F	Nights lengthened 2 h. 40 m.	min	3	52	11		30
13	S	*Wind and frequent*	bow	☽ Sets		0	A	11
14	B	10 Sunday after Trinity	belly	7	N 2	0		51
15	M	Assump. B. M.	reins	7	13	1		33
16	T	*Storms of Rain or Hail,*	and	7	27	2		16
17	W	☉ Amplitude 16° 5′	loin	7	43	3		4
18	T	Da. 13h. 42m. N. 10h. 18. m. long	ſecr.	8	0	3		54
19	F	*and perhaps ſome*	blad	8	27	4		45
20	S	*ſudden Claps of Thunder.*	hips	9	7	5		45
21	B	11 Sunday after Trinity	thig.	10	8	6		48
22	M	☉ Amp. 13° 6′ North	knee	11	23	7		51
23	T	*Showery, and like to be but bad*	ham	Morn.		8		50
24	W	St. BARTHOLOMEW	legs	0	49	9		50
25	T	Days decreas'd 3 h. 27 min.	ankl	2	21	10		47
26	F	*Weather for Harveſt to the End.*	feet	3	56	11		38
27	S	Dog Days end	toes	☽ Riſes		Morn.		
28	B	12 Sunday after Trinity	head	6	N 30	0		27
29	M	☉ due E. 6 h. 16 m. Al. 6° 28	and	6	44	1		17
30	T	Days 12 hours 47 min. long	face	7	8	2		5
31	W	Day decreaſed 3 h. 56 min.	neck	7	23	2		58

M D	Sun Riſes.	Sun Sets.	Saturn Sets.	Jupiter Sets.	Mars Riſes.	Venus Riſes.	Mercu. Riſes.	Watch too faſt.
6	4 46	7 13	9 N 21	3 M 53	3 M 26	5 M 39	4 M 17	3 33
12	4 58	7 1	9 0	3 26	3 28	4 59	3 37	2 8
18	5 10	6 49	8 39	3 0	3 29	4 18	3 25	0 28
24	5 22	6 37	8 19	2 35	3 29	3 43	3 42	1 slow 25
31	5 36	6 25	7 53	2 6	3 29	3 10	4 23	2 45

SEPTEMBER hath xxx Days.

M D	Day Breaks.	Sun's Declin.
6	3 44	2 N 3
12	3 57	0 S 18
18	4 12	2 37
24	4 25	4 57
30	4 39	7 15

Last Quarter 3 Day at 2 Afternoon
New Moon 11 Day at 6 at Night
First Quarter 18 Day at 11 at Night
Full Moon 25 Day at 6 at Night

			thro	7 M48	3 M48
1	T	☉ Amplitude 6° 48′ North	arm	8 30	4 42
2	F	LONDON burnt 1666	sho.	9 25	5 35
3	S	☉ Due E. 6 h. 11 m. Alt. 4° 37′	brea	10 21	6 28
4	B	13 Sunday after Trinity	and	11 38	7 17
5	M	*Now expect a good*	ston	Morn.	8 5
6	T	Days decreas'd and Nights in-	hear	0 43	8 53
7	W	creas'd 4 hours 46 min.	back	1 56	9 36
8	T	*Season for*	bow	3 9	10 19
9	F	*the Harvest.*	and	4 21	11 0
10	S	Equal Day and Night in all	belly	☽ Sets	11 43
11	B	14 Sun. after Trin. ☉ in ♎ 5°	rein	5 N 45	0 A 26
12	M	the habitable World [15′. p. m.	join	6 0	1 10
13	T	*A few flying Showers may be*	secr.	6 19	2 0
14	W	Holy Rood Day	blad	6 42	2 52
15	T	☉ Amplitude 2° 9′ South	hips	7 20	3 49
16	F	*expected but not much Wet.*	thig	8 14	4 51
17	S	Day 11 h. 32 min. and Nights	kne	9 19	5 52
18	B	15 Sunday after Trinity	and	10 41	6 50
19	M	12 hour and 28 min. long	arms	Morn.	7 49
20	T	*Now more windy, and fair for*	legs	0 12	8 43
21	W	S. MATTHEW Evan. Em. We:	ankl.	1 39	9 36
22	T	☉ Amplitude 6° 49′ South	feet	3 6	10 25
23	F	*the most part*	toes	4 37	11 15
24	S	Days decreas'd 5 h. 36 min.	head	☽ Rises	Morn.
25	B	16 Sunday after Trinity	face	5 N 16	0 6
26	M	☉ Amplitude 9° 24′ South	neck	5 35	0 55
27	T	*Still expect good Weather*	thro.	6 0	1 47
28	W	*for Harvest*	arms	6 35	2 39
29	T	St. MICHAEL the Arch Angel	shoul	7 21	3 33
30	F	Day 10 ho. 44 min. long			

M D	Sun Rises.	Sun Sets.	Saturn Sets.	Jupiter Sets.	Mars Rises.	Venus Rises.	Mercu. Sets.	Watch too slow
6	5 48	6 11	7 N33	1 M44	3 M30	2 M49	6 N1	9 50
12	6 1	5 58	7 13	1 20	3 32	2 31	6 8	7 55
18	6 12	5 47	6 53	0 57	3 35	2 29	6 0	9 54
24	6 24	5 35	6 33	0 34	3 33	2 26	5 49	11 45
30	6 37	5 22	6 12	0 13	3 34	2 25	5 40	13 20

OCTOBER hath xxxi Days.

M D	Day Breaks	Sun's Decl.
Last Quarter 3 Day at 10 in the Morning	6 4 50	9 S 28
New Moon 11 Day at 8 in the Morning	12 5 1	11 40
First Quarter 18 Day at 6 in the Morning	18 5 12	13 41
Full Moon 25 Day at 7 in the Morning	24 5 25	15 35
	31 5 34	17 43

1	S	*Now expect ſhowry Weather,*	ſhou.	8	N	18	4	M	24
2	B	17 Sunday after Trinity	brea.	9		21	5		18
3	M	*with briſk Gales of Wind.*	ſtom	10		33	6		6
4	T	☉ Amplitude 14° 39′ South	heart	11		46	6		55
5	W	Days now dec. and Nights in-	and	Morn.			7		39
6	T	creaſed 6 hours 25 minutes	back	1		0	8		21
7	F	*Perhaps now about, more fair,*	how	2		13	9		4
8	S	*with ſome froſty Mornings.*	belly	3		25	9		45
9	B	18 Sunday after Trinity	veins	4		38	10		28
10	M	**Oxf.** and **Camb.** Terms begin	loins	5		58	11		13
11	T	King George II. Crowned	ſecr.	☽ Sets			0	A	1
12	W	Days 9 hours 53 min. long	and	4	N	54	0		54
13	T	*Briſk Winds,*	*cods*	5		31	1		48
14	F	*but moſtly Fair.*	hips	6		16	2		49
15	S	☉ Amplitude 24° 28′ South	thig.	7		17	3		51
16	B	19 Sunday after Trinity	kne.	8		37	4		54
17	M	Days decreas'd 7 ho. 14 min.	ham	10		6	5		52
18	T	St. LUKE the Evangeliſt	legs	11		32	6		47
19	W	Days 9 hours 28 min. long	ink.	Morn.			7		38
20	T	Tres Mich. 1 Return	feet	0		58	8		26
21	F	*Now more Rain may be expected*	toes	2		23	9		14
22	S	Princeſs of ORANGE born	head	3		49	10		0
23	B	20 Sund. after Trinity.	face	5		12	10		49
24	M	Term begins	neck	6		37	11		37
25	T	**Criſpin**	nd	Riſes			Morn.		
26	W	*More fair and pleaſant*	hro.	4	N	33	0		31
27	T	Menſ. Mich. 2 Return	rms	5		16	1		25
28	F	St. SIMON and JUDE Apoſtles	hou	6		10	2		16
29	S	*at the End.*	rea.	7		13	3		10
30	B	21 S. aft. Trin. K. GEO. II. bo.	hom	8		21	4		2
31	M	Days decr. 8 h. 30 m. 1683	heart	9		33	4		50

M D	Sun Riſes.	Sun Sets.	Saturn Sets.	Jupiter Sets.	Mars Riſes.	Venus Riſes.	Mercu. Sets.	Watch too ſlow
6	6 51	5 8	5 N 50	11 N 48	3 M 32	2 M 29	5 N 28	14 40
12	7 3	4 56	5 29	11 27	3 31	2 35	5 20	15 36
18	7 15	4 44	5 8	11 6	3 29	2 44	5 11	16 8
24	7 27	4 33	4 45	10 44	3 27	2 54	5 2	16 13
31	7 40	4 19	4 18	10 20	3 23	3 8	5 0	15 44

NOVEMBER hath xxx Days.

M. D	Day Break	Sun's Decl.
6	5 42	19 S 11
12	5 49	20 31
18	5 56	21 38
24	6 0	22 30
30	6 2	23 6

Last Quarter 2 Day at 7 in the Morn.
New Moon 9 Day at 8 at Night
First Quarter 16 Day at 2 in the Afternoon
Full Moon 23 Day at 10 at Night.

1	T	All Saints	heart	10 N 47	5 M 34
2	W	All Souls [3 Ret.	back	11 57	6 15
3	T	All S. Col. Elect. Cr. Ani.	bow	Morn.	6 57
4	F	*The Beginning of*	belly	1 8	7 39
5	S	Gun Powder Plot anno 1605	reins	2 14	8 20
6	B	22 Sunday after Trinity	and	3 38	9 5
7	M	Day 8 hours 16 min. long	loins	4 56	9 51
8	T	*this Month is likely to*	feet.	6 16	10 42
9	W	*be show'ry and wet.*	blad.	☽ Sets	11 34
10	T	☉ Ampli. 34° 49′. South	hips	4 N 0	0 A 35
11	F	Martin Bishop of Tours	thig.	5 4	1 36
12	S	Craft. Mart. 4 Return	kne.	6 10	2 39
13	B	23 Sunday after Trinity	ham	7 45	3 42
14	M	Prince WILL. HEN. born	legs	9 13	4 37
15	T	*Not unpleasant about*	ankl.	10 43	5 30
16	W	☉ Ampli. 37° 6 South	feet	Morn.	6 18
17	T	Day 7 hours 3 quarters long	toes	0 15	7 6
18	F	*the middle, for the Season.*	head	1 30	7 53
19	S	Prs. of W. born Oct. Mar. 5 ret.	and	2 48	8 40
20	B	24 Sunday after Trinity	face	4 11	9 27
21	M	*Sleet and Showers*	neck	5 34	10 17
22	T	*with stormy Winds.*	thro.	6 49	11 10
23	W	Clement	arms	☽ Rises	Morn.
24	T	Days decreased and Nights	sho.	3 N 51	0 2
25	F	Quin. Mar. 6 Ret. Catharine	brea.	4 50	0 54
26	S	increased 9 hours 12 min.	and	5 57	1 46
27	B	Adv. Sunday Mar. goes out	stom	7 7	2 35
28	M	Term ends Ball. Col. Elect.	heart	8 20	3 20
29	T	*The End fair and frosty.*	back	9 32	4 3
30	W	St. ANDREW Apostle	bow.	10 42	4 45

M D	Sun Rises.	Sun Sets.	Saturn Rises.	Jupiter Sets.	Mars Rises.	Venus Rises.	Mercu. Sets.	Watch too slow
6	7 50	4 9	6 M 28	10 N 0	3 M 22	3 M 20	4 N 12	14 38
12	7 59	4 0	6 7	9 39	3 18	3 33	4 32	13 4
18	8 7	3 52	5 47	9 19	3 17	5 46	Rises.	11 6
24	8 13	3 46	5 27	9 0	3 11	4 0	6 M 57	8 45
30	8 18	3 41	5 1	8 38	3 5	4 13	6 18	6 3

DECEMBER hath xxxi Days.

	M	D	Day breaks		Sun's Decl.	
Last Quarter 2 Day at 3 in the Morning		6	6	4	23 S	25
New Moon 9 Day at 8 in the Morning		12	6	3	23	28
First Quarter 15 Day at 12 at Night		18	6	3	23	14
Full Moon 23 Day at 5 at Night		24	5	59	22	43
Last Quarter 31 Day at 9 at Night		31	5	55	21	46

			belly	11	N	53	5	26
1	T	*Frosty, fair and*	reins	Morn.			6	5
2	F	*pleasant at the*	and	1		3	6	48
3	S	*beginning.*	loins	2		19	7	31
4	S	Sunday in Advent	secr.	3		38	8	17
5	M	☽ great Ampl. at LON. 39° 50′	blad.	5		0	9	9
6	T	at NOTTINGHAM 41° 28′	thig.	6		23	10	6
7	W	Princess Louisa born	hips	7		39	11	8
8	T	Shortest Day at Lond. 7 h. 35 m.	knee	☽ Sets			0A	11
9	F	at Nottingham 7 h. 18 min.	ham	5	N	3	1	14
10	S	☉ enters ♑ 9 h. 56 min. A. M.	legs	6		36	2	13
11	S	Sunday in Advent	ankl	8		10	3	7
12	M	The gr. short. at Lond. 8 h. 50′	feet	9		36	4	1
13	T	Lucy	and	11		3	4	51
14	W	Ember Week	toes	Morn.			5	38
15	T	at Nottingham 9 h. 24 min.	head	0		25	6	24
16	F	Cambridge Term ends	face	1		47	7	10
17	S	Oxford Term ends	neck	3		6	8	1
18	S	4 Sunday in Advent	thro.	4		27	8	51
19	M	Day 7 hours 22 min. long	arms	5		40	9	42
20	T	*Windy Weather,*	and	6		44	10	34
21	W	St. THOMAS the Apostle	tho.	7		38	11	25
22	T	*with Rain,*	brea.	8		0	Morn.	
23	F	*Sleets or Snow.*	bom	☽ Rises			0	15
24	S	Days increas'd 13 minutes	heart	5	N	55	1	2
25	S	CHRISTMAS Day	and	7		5	1	49
26	M	St. STEPHEN Proto-Martyr	back	8		14	2	30
27	T	St. JOHN Evangelist	bow	9		26	3	10
28	W	Innocents, or Herod's Murd. Inf.	belly	10		38	3	49
29	T	*Cold Rain or Snow*	reins	11		49	4	27
30	F	Princess ELIZABETH born	loins	12		52	5	12
31	S	*at the end of the Year.*						

M	D	Sun Rises.		Sun Sets.		Saturn Rises.		Jupiter Sets.		Mars Rises.		Venus Rises.		Mercury Rises.		Watch too slow	
	6	8	21	3	38	4	M 38	8	N 18	2	M 57	4	M 24	6	M 16	3	7
	12	8	22	3	37	4	15	7	59	2	52	4	39	6	27	0	6
	18	8	20	3	39	3	51	7	39	2	48	4	49	6	46	2fa.	53
	24	8	15	3	4	3	27	7	19	2	42	5	7	7	6	5	42
	31	8	8	3	52	3	0	6	58	2	35	5	24	7	27	8	40

A TABLE of all the Kings and Queens of *England* since the Conquest.

Names.	Born.	Began to Reign.			Y.	M.	D.	Beg.	End.
William Conq.	1027	1066	October	14	20	10	26	682	661
William Rufus	1057	1087	Septem.	9	12	10	24	661	648
Henry I.	1058	1100	Auguſt	2	35	4	0	648	605
Stephen	1105	1135	Decem.	1	18	10	24	605	594
Henry II.	1134	1154	October	25	34	8	11	594	559
Richard I.	1156	1189	July	6	9	9	0	559	549
John	1166	1199	April	6	17	6	13	549	532
Henry III.	1207	1216	October	19	56	1	0	532	476
Edward I.	1239	1272	Novem.	16	34	7	21	476	441
Edward II.	1284	1307	July	7	19	6	13	441	421
Edward III.	1312	1327	January	20	50	5	1	421	371
Richard II.	1366	1377	June	21	22	3	8	371	349
Henry IV.	1367	1399	Septem.	29	13	5	21	349	335
Henry V.	1389	1413	March	20	9	5	11	335	324
Henry VI.	1421	1422	Auguſt	31	38	6	4	324	287
Edward IV.	1442	1461	March	4	22	1	5	287	265
Edward V.	1471	1483	April	9	0	2	13	265	265
Richard III.	1443	1483	June	22	2	2	0	265	263
Henry VII.	1457	1485	Auguſt	22	23	8	0	263	239
Henry VIII.	1492	1509	April	22	37	9	6	239	201
Edward VI.	1537	1547	January	28	6	5	8	201	195
Mary I.	1516	1553	July	6	5	4	11	195	190
Elizabeth	1533	1558	Novem.	17	44	4	7	190	145
James I.	1566	1603	March	24	22	0	3	145	123
Charles I.	1600	1625	March	27	23	10	3	123	99
Charles II.	1630	1649	January	30	36	0	7	99	63
James II.	1633	1685	February	6	4	0	7	63	59
Mary II.	1662	1689	Feb.	13	5	10	15	59	54
William III.	1650				13	0	23	59	46
Anne	1665	1702	March	8	12	4	24	46	34
George I.	1660	1714	Auguſt	1	12	10	10	34	21
George II.	1683	1727	June	11	whom God preſerve.				

The Year of the Birth of each King and Queen; alſo the Year, Month, and Day, whereon they began to reign: beginning the Year the firſt Day of January, 1747.

The Length of each Reign.

The Years expired ſince each Reign began and ended.

A Compendious TABLE of INTEREST,

Shewing the Interest of any Sum of Money, from a Million to a Pound; for any Number of Days, at any Rate of Interest.

No.	l	s.	d.	q.	No.	l.	s.	d.	q.
1000000—	2739	14	6	0 ,99	1000—	2	14	9	2 ,14
900000—	2465	15	0	3 ,29	900—	2	9	3	3 ,12
800000—	2191	15	7	1 ,59	800—	2	3	10	0 ,11
700000—	1917	16	1	3 ,89	700—	1	18	4	1 ,10
600000—	1643	16	8	2 ,19	600—	1	12	10	2 ,08
500000—	1369	17	3	0 ,49	500—	1	7	4	3 ,07
400000—	1095	17	9	2 ,79	400—	1	1	11	0 ,05
300000—	821	18	4	1 ,09	300—	0	16	5	1 ,04
200000—	547	18	10	3 ,40	200—	0	10	11	2 ,02
100000—	273	19	5	1 ,70	100—	0	5	5	3 ,01
90000—	246	11	6	0 ,32	90—	0	4	11	0 ,71
80000—	219	3	6	2 ,96	80—	0	4	4	2 ,41
70000—	191	15	7	1 ,59	70—	0	3	10	0 ,11
60000—	164	7	8	0 ,22	60—	0	3	3	1 ,81
50000—	136	19	8	2 ,85	50—	0	2	8	3 ,51
40000—	109	11	9	1 ,48	40—	0	2	2	1 ,21
30000—	82	3	10	0 ,11	30—	0	1	7	2 ,90
20000—	54	15	10	2 ,74	20—	0	1	1	0 ,60
10000—	27	7	11	1 ,37	10—	0	0	6	2 ,30
9000—	24	13	1	3 ,23	9—	0	0	5	3 ,67
8000—	21	18	4	1 ,10	8—	0	0	5	1 ,04
7000—	19	3	6	2 ,96	7—	0	0	4	2 ,41
6000—	16	8	9	0 ,82	6—	0	0	3	3 ,76
5000—	13	13	11	2 ,68	5—	0	0	3	1 ,15
4000—	10	19	2	0 ,55	4—	0	0	2	2 ,52
3000—	8	4	4	2 ,41	3—	0	0	1	3 ,80
2000—	5	9	7	0 ,27	2—	0	0	1	1 ,26
1000—	2	14	9	2 ,14	1—	0	0	0	2 ,63

RULE.

Multiply the Sum by the Number of Days; and that Product by the Rate per Cent. Then cut off the two last Figures to the right Hand, and the rest you must find in the Table.

Example, What is the Interest of 100 l. for 365 Days at 5 per Cent

No. of Days	365			Then in the Table					
multiply by	100			against	1000	is 2	14	9	2 ,14
Product	36500				800	2	3	10	0 ,11
multiply by	5	Rate p. Cent.			20	0	1	1	0 ,60
	1825100				5	0	0	3	1 ,15
				Answ.	5	0	0	0	0 ,00

Within the Compass of this Year,
But two Eclipses will appear;
Altho' in Number there are Four,
Two only will be seen; no more.

The Sun shall first in Darkness be,
Next Luna's lower Part you'll see
Depriv'd of Light; now if you'd know
When these will happen, see below.

The first is of the Sun. *January* 19, about 3 in the Morning, therefore invisible.

The second is of the Moon, *Wednesday February* the 3d, near Noon, so not visible to us of this Isle; but in the Northern Parts of *New England* she will rise in the Middle of her Eclipse.

The third is a great and visible Eclipse of the Sun; for on the North-side more than ¾ of the Diameter will be eclipsed.

The Time whereof is as follows:

July 14. 1748 Appt. Time At Furneaux Pelham Morning.	Begin.	Middle	End	Durat.	Digits
	h ′ ″	h ′ ″	h ′ ″	h ′ ″	d ′ ″
	9 2 45	10 38 39	12 17 0	3 14 15	10 24 9

Note, In Lat. 35° 9′ N. and Long. 51° 6 W. from *London* the Sun will rise eclipsed.

In Lat. 24° 0′ S. and Long. 58° 4′ East from *ditto* the Eclipse will end at Sun set.

In Lat. 51° 38′ N. and Long. 14° 10′ E. the Sun will be centrally eclipsed in the Meridian. And

In Lat. 21° 12′ N. and Long. 14° 0′ E. the Sun's upper Limb will touch the Moon's lower.

The Places on the Globe agreeable thereto are the *Atlant. Indian* Sea, *Dantzick* and *Barbary*, &c.

The last Eclipse is of the Moon, and visible, if the Air be clear, on *Thursday July* 28, 11h 3′. J. HOLLINGWORTH.

Mr. *Thomas Sparrow*, Mr. *Thomas Cowper*, and Mr. *William Mobbs* have favoured us with Calculations of the Sun's Eclipse for *Mansfield*, *Wellingborough*, and *Heath*; as below. And * Mr. *John Thorpe* for *Nottingham*.

Morning	Mansfd	Wellingb.	Heath	Nottingh.*
	h ′	h ′ ″	h ′ ″	h ′
Beginning July 14	8 56	8 57 50	9 6 30	9 7
Visible Conjunction		10 25 16	10 30 25	10 41
Middle - -	10 28	10 28 15	10 29 47	10 44
End. Afternoon - -	0 4	0 1 58	0 5 47	0 15
Duration - -	3 8	3 4 8	2 59 17	3 8
Digits Eclipsed - -	10° 10″	10°14	10 9 55	10 22

N. B. Mr. *Cowper*'s Calculation was from *Brent*'s Tables, *Machin*'s Numbers.

* From *Sheet*'s *Astronomia Carolina*, apparent Times.

The general Appearances of the aforeſaid *Solar Eclipſe* with Regard to the Meridian of *London*, may be expected as follows.

	Ap. Time h ′ ″	Lat. N. ° ′	Longit. ° ′	
The Eclipſe begins at Sun-riſe	8 21 41	35 44	50 17 W.	From London
The Sun riſes centrally eclipſed	9 36 25	46 29	76 8	
Centrally eclipſed in the Meridian	10 56 52	53 0	15 17 E	
Centrally eclipſed in the Nonages. Deg.	11 21 56	49 57	22 43 E.	
Sun ſets centrally eclipſed P. M.	0 59 59	11 41	79 13 E.	
The Eclipſe ends at Sun-ſet	2 14 41	0 23	56 28 E.	
Sun's upper touched by the Moon's lower Limb in the Meridian		23 46	15 42 E.	

THOMAS COWPER.

Mr. *Thomas Sparrow* gives the following general Account of the ſaid *Eclipſe*.

In the North Latitude of 13° 45′, and 50° 30′ Weſt from *London* (which Place is in the *Atlantic* Ocean) this Eclipſe firſt begins.

And this, as well as all other Eclipſes of this kind, always begins in the ſupreme Point of the Sun's Vertical Diameter as he riſes.

In Latitude 46° 50′ North, and Longitude 75° 30′ Weſt of *London*, the Sun will riſe centrally eclipſed; which Place (if my Globe is right) is in *New France* in North *America* not far from *Quebeck*.

In Latitude 53° 30′ long; 16° 20′ Eaſt of *London*, the Sun will tranſit the Meridian centrally eclipſed; which Place ſeems to be between *Brandenburgh* and *Dantzick*.

In the North Latitude of 81° 40′ (being beyond the Pole) and Longitude 16° 20′ Eaſt of *London*, the Sun's lower will ſeem to be touched by the Moon's upper Limb in the North Part of the Meridian.

The Sun's upper Limb will be touched by the Moon's lower Limb in the Meridian in the Latitude 21° 30′ North, and Longitude 16° 20′ Eaſt of *London*: Which Place falls in the barren mountainous Country of *Barbary*.

The Sun will ſet centrally eclipſed about the North Latitude of 12° and Longitude 81° Eaſt of *London*: This Place is in the *Eaſt-Indies*.

And

And in the North Lat. of 20' Minutes, Longitude 58° East of *London* (under which Poſition lies part of the *Indian* Ocean) the Eclipſe may be ſeen ending in the ſuperior Point of his Vertical Diameter as he ſets. This being the laſt Place on the Terraqueous Globe that will ſee this Eclipſe.

We have alſo received a general Account of the ſaid Eclipſe with reſpect to the Meridian of *London*, with the Times of its principal Appearances for the ſame *Place* by Calculation; alſo a very curious Projection of the ſame, from our ingenious Contributor *Mr. William Sutton*. The Projection is quite too large for this Place: The reſt you may find among the Works of our other ingenious Contributors in the following *Table*.

July 14. Morning Ap. Time		Beg. h	'	Midd. h	'	End h	'	Durat. h	'	Digit. h	'
Mr. W. Sutton. Lond. by Calculat		9	6	10	41	0	19	3	13	10	50
Mr. W. Sutton by Conſtruction	Edenburgh	8	51	10	22	11	55	3	4		
	Coventry	9	1	10	28	0	11	3	10	10	21
	Rome	10	20	11	53	1	42	3	22	8	42
	Alexandia	12	50	2	21	3	53	3	3	9	15
Mr. James Elgar by Leadbetter's Tab.	London	9	5	10	41	0	19	3	14	10	32
	Edenburgh	8	53	10	24	11	58	3	5	11	28
	Dublin	8	30	10	1	11	37	3	7	10	47
	Liſbon	8	10	9	42	11	14	3	4	5	40
	Madrid	8	45	10	21	0	3	3	18	7	19
	Paris	9	17	10	55	0	37	3	20	9	51
	Vienna	10	30	0	12	1	53	3	23	10	57
	Elcot	8	58	10	33	0	12	3	14	10	26
Mr. J. Turner, by Conſtr. for Hull.		9	0	10	31	0	5	3		10	7
Mr. John Skay for Long Compton		9	2	10	28	0	5	3	3	10	8
Mr. Tho. Harbridge for London		8	57	10	29	0	6	3	9	9	57
Mr. Thomas Dod	Marchamley	8	55	10	31	0	9	3	14	10	27
	W. Cheſter	8	53	10	30	0	7	3	14	10	27
	Dublin	8	37	10	13	11	51	3	14	10	27
Mr. W. Foxton, Leadbetter, London		9	5	10	46	0	19	3	15	10	31
Mr. John Harvey, St. Ives		8	54	10	23	11	56	3	2	10	0
Mr. Robert Robinſon	London	9	1	10	33	0	12	3	11	9	55
	Stocton	8	59	10	34	0	8	3	9	11	1
	Madrid	8	48	10	12	11	52	3	4	6	0
Mr. Sam. Sector	London	8	57	10	28	0	7	3	10	9	59
	Newport Shropſh.	8	47	10	16	11	54	3	7	10	27
John James, for London		9	6	11	37	0	7	3	1	10	41
Mr. Tho. Allen	for London	9	4	10	41	0	18	3	14	10	31
	for Leiceſter	8	59			0	13	3	14		

		Beg. h ′	Mid. h ′	End h ′	Durat. h ′	Digit ° ′
Mr. J. Walker, by Brent	London	9 1	10 32	12 6	3 5	10 1
	Kettering	8 57	10 27	12 1	3 4	10 15
Mr. Peter Door,	London	9 9	10 43	12 22	3 13	10 12
Mr. John Williams, jun.		9 6	10 36	12 9	3 3	11 1
Mr. Jos. Pilgrim,	Whitwell	9 30	10 56	12 26	2 56	10 23
Mr. John Brown,	London	9 2	10 38	12 14	3 12	10 16

N. B. Mr. *John Turner* of *Hull* sent us a very curious Account of the aforesaid general *Eclipse*; but the narrow Bounds we are here confined to has obliged us to drop that, with many other valuable Productions of his and our other ingenious Correspondents: And therefore shall proceed to the MOON'S ECLIPSE that will happen *July* 28, in the Evening, as in the following TABLE.

		Beg. h ′	Mid. h ′	End h ′	Dur. h ′	Dig. ° ′
Mr. Jo. Brown	Witton-le-Wear	10 42	11 57	12 51	2 9	+ 43
	London	10 48	11 53	12 57	2 9	+ 43
Mr. T. Dodd	Marchamley, Shropshire	10 10	11 24	12 38	2 28	+ 40
	W. Chester	10 8	11 22	12 36		
	Dublin	9 52	11 6	12 20		
Mr. W. Foxton, by Leadbet's T.	for London	10 48	11 30	12 12	2 24	+ 51
	for Hovingham	10 45	11 27	12 9		
Mr. Rob. Roinson	Newcastle	10 42	11 47	12 51	2 9	+ 43
	Stocton	10 43	11 48	12 52		
	Madrid	10 35	11 40	12 45		
Mr. James Elgar	London	10 27	11 32	12 36	2 9	+ 45
	Elcott	10 22	11 27	12 31		
Mr. Sam. Sector	London	10 10	11 16	12 23	2 13	− 3
	Nowport Shorpsh.	10 1	11 7	12 14		
Mr. William Mobbs, Heath		10 26	11 37	12 33	2 7	+ 40
Mr. Jos. Walker, Kettering		10 6	11 13	12 19	2 13	+ 58
Mr. Joh. William, jun. Mold in Kin.		10 25	11 29	12 33	2 8	+ 41
Mr. Tho. Cowper, Brent. London		10 9	11 15	12 12	2 2	+ 58
Mr. Thomas Sparrow, Mansfield		10 26	11 30	12 33	2 7	+ 38

Answers

Anſwers to the MATHEMATICAL Queſtions of 1747.

Queſtion 61. anſwered by Mr. *William Kingſtone.*

First, for the leaſt Number that being divided by 20, leaves 19, and divided by 19 leaves 18, let the Quotient be expreſs'd by x; Then $\left(\frac{20x+19-18}{19}\right)\frac{20x+1}{19} = x + \frac{x}{19} + \frac{1}{19}$, or $\frac{x+1}{19}$ = a whole Number; whence the leaſt Value of x is 18, and conſequently $20x + 19 = 379$, which is the leaſt whole N°. that can ſatisfy the two firſt Conditions of the *Prob.* Then let the the leaſt Number that is exactly diviſible by 20 and 19 be now aſſumed, which becauſe 20 and 19 are prime to each other, will be $20 \times 19 = 380$. Now ſince the Number required muſt be a Multiplier of $380 + 379$, 'tis plain the the ſaid Number may be expreſſed by $380x + 379$: Then will $\frac{380x+379-17}{18} = \frac{190x+181}{9} = 21x + \frac{x}{9} + 20\frac{1}{9}$, or $\frac{x+1}{9}$ muſt be a whole Number. Whence the leaſt Value of x is $= 8$, and $380x + 379 = 3419$. And by proceeding in the above Method, I find the three leaſt N°s. 65414709359, 3079845568 79, and 594856026719, reſpectively.

The ſame anſwered by Mr. *Robert Robinſon.*

Let a, b, c, d, &c. repreſent the Quotients reſpectively produced by dividing x by 2, 3, 4, 5, &c. then will the Remainders be 1, 2, 3, 4, &c. Hence $x = 2a + 1, = 3b + 2 = 4c + 3 = 5d + 4$, &c. - - - - to $20A + 19$; Now $a = b + \frac{b+1}{2}$, hence $\frac{b+1}{2} = m$ a whole Number, $\therefore b = 2m - 1$ and $a = 3m - 1$. Again, $c = m - 1 + \frac{m}{2}$ hence $\frac{m}{2} = n$ a whole Number, and therefore $m = 2n$, $c = 3n - 1$ and proceeding in this Manner we get $A = 11639628B - 1$; Hence the number required $x = 232792560B - 1$, where B repreſents any whole poſitive Number, and when $B = 1$ then

the Number required $x = 232792559$
2. - - - $= 465585119$
3. - - - $= 698377679$
And thus may be formed other Numbers *ad Infinitum*.

These last Numbers exactly agree with Mr. *Lord's*, the *Proposer*.

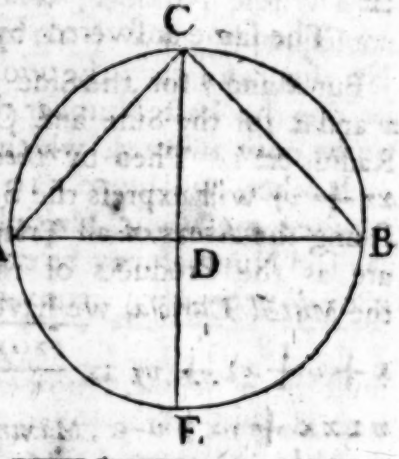
Mr. *Thomas Moss* also favoured us with a very elegant Solution to the same, which, for want of Room, must be here omitted.

Question 62, answered by Mr. Rob. Robinson.

Let the Sum of the Sides of the Triangle $= s = 120$, Diam. of the circumscribing Circle $= d = 49,0197$; and put $x = AB$, $y = CD$; then will $AC \times BC = dy$, and $AC + BC = s - x$; hence

$$AC = \frac{s - x + \sqrt{s - x|^2 - 4dy}}{2},$$

$$BC = \frac{s - x - \sqrt{s - x|^2 + 4dy}}{2}.$$



And by Trigonom. $x : s - x :: \sqrt{s - x|^2 - 4dy} :$ Diff. Segments $= \frac{s - x}{x}\sqrt{s - x|^2 - dy}$; then is $AD = \frac{x}{2} + \frac{s - x}{2x}\sqrt{s - x|^2 - 4dy}$, and since $\overline{AC}|^2 = \overline{AD}|^2 + \overline{DC}|^2$ we have $y^2 + \frac{8sdx - 4ds^2y}{4x^2} = \frac{4s^3x - s^4 - 4s^2x^2}{4x^2}$, hence

$$yx = \frac{2sdx - ds^2 \pm s\sqrt{4sx^3 - s^2x^2 - 4x^4 + 4d^2x^2 - 4d^2sx + 4d^2s^2}}{2x}$$

a Max. or $-\frac{ds}{x} \pm \sqrt{4sx - s^2 - 4x^2 + 4d^2 - 4d^2sx^{-1} + a^2s^2x^{-2}}$, this fluxed and reduced gives $\overline{2x - s}|^2 \times 4x^4 - 4sd^2x + s^2d^2 = 0$ hence $4x^4 + 4sd^2x = s^2d^2 = 0$, or $x^4 - sd^2x + \frac{s^2d^4}{4} = 0$, whence the rest may be found.

The

The ſame anſwered by Mr. *John Turner*.

Put $b = 49{,}02$ Rods, the Field's Diameter $2C = 120$; $CD = x$ $DE = b - x$: Then is $AB = 2\sqrt{bx - x^2}$; and $AC = BC = \sqrt{bx}$ by the Circles Property. Hence $2\sqrt{bx - x^2} + \sqrt{bx} = 2c$, which involved and tranſpoſed gives this Equation $-x^4 - 2c^2x^2 + 4c^2bx = c^4$, in this Equation x has two affirmative Values 25,7 and 45,4 but the former is that which anſwers the Queſtion. Conſequently $CD = 25{,}7$; $AB = 48.97$; $AC = BC = 35{,}49$, and the Area $= 629{,}26$ ſquare Rods $= 3$ A. 3 R. 29¼ Perches.

The ſame anſwered by Mr. THOMAS GARRARD.

Put x and y for the Sine and Coſine of half the Arch AC; v and z for the Sine and Coſine of half the Arch BC; and Radius $= 1$. Then by *Theorem* 1. p. 3. of *Thacker's Miſcell.* $xz + vy$ will expreſs the Sine of half the Arch ACB. And ſeeing the Areas of all Triangles inſcribed in the ſame Circle, are as the Products of their Sides (ſee p. 117, N° 4. of the *Miſcell. Curioſa*) we have by the Queſtion

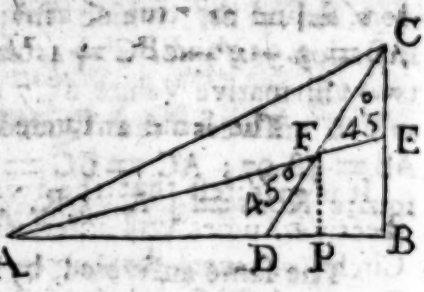
$x + v + xz + vy = \frac{120 \times 3.14159 \&c.}{154} = 2b$; and $vzxx + yxvv$ a *Maximum*; by Tranſpoſition $vy = 2b - x - v - xz$, this put for vy in the Expreſſion for the *Maximum* will become $2bvx - vxx - xvv$, and by making x flow, $2bv\dot{x} - 2vx\dot{x} - vv\dot{x} = 0$: alſo by making v flow, $2b\dot{x}v - x\dot{x}v - 2xv\dot{v} = 0$. By the firſt of theſe Equations we have $2b = 2x + v$; and by the latter $2b = 2v + x$; whence $x = v$, and conſequently $y = z$. And now it appears that the Triangle muſt be Iſoſceles. Th. writing x for v, and $\sqrt{1 - x^2}$ for y and z reſpectively; we have $2x + 2x\sqrt{1 - x^2} = 2b$, which brought out of Surds and reduced gives $x = .7246272$; and $2x\sqrt{1 - x^2} = .9987407$. Now ſay by the Rule of Three 3.14159 &c. : 154 :: ,7246272 : 35,52102 = AC = BC : 3,14159 &c. : 154 :: ,9987407 : 48,95796 = AB, whence the Area = 630 0771 Rods.

We alſo received very curious Solutions to this Queſtion from Mr. *Charles Smith*, Mr. *Edward Croſs*, Mr. *James Elgar*, Mr. *Thomas Moſs*, Mr. *William Bevil*, Mr. *Thomas Cooper*, and

Mr. *William Kingſtone*, with many others, as may be ſeen in the Catalogue.

Queſtion 63 anſwered by Mr. *John Tod*, the Propoſer.

Put $a = AE = 4$, $b = CD = 2$, and x and y = Sine and Coſine of the $\angle BAC$; then $\sqrt{\frac{1+y}{2}}$ = Cos. $\angle$ BAE and $\sqrt{\frac{x+1}{2}}$ = Cos. $\angle$ BCD (as might eaſily be ſhewn from *Eig.* 3. *Supp.* 1. and by *Trig.*



$x : b :: \sqrt{\frac{1+x}{2}} : \frac{b}{x}\sqrt{\frac{1+x}{2}} = AC$, and $y : a :: \sqrt{\frac{1+y}{2}} : \frac{a}{2}\sqrt{\frac{1+y}{2}} = AC = \frac{b}{x}\sqrt{\frac{1+x}{2}}$, $\therefore \sqrt{\frac{1+x}{1+y}} = \frac{ax}{by} = \frac{2x}{y}$, in which ſubſtituting $\frac{2t}{1+t^2}$ for x, and $\frac{1-t^2}{1+t^2}$ for y (ſee *Thacker's Miſcell.* p. 38.) we have $\frac{1+t}{\sqrt{2}} = \frac{4t}{1-t^2}$: Hence $t^3 + t^2 + 4\sqrt{2} - 1 \times t = 1$. Solved $t = .20,3982 =$ Tangent $\angle$ BAC $= 11^{\circ}\ 31'\ 45''$. Hence AB $= 3.9193$, BC $= 1.6683$ and AC $= 4.2596$.

The ſame anſwered by Mr. *John Turner*.

Let Sine $\angle$ ACD $= x$; then Sine $\angle$ ACB $= 2x\sqrt{1-x^2}$: CD $= b$, AE $= c$. and Sine $\angle$ CAB $= 1-2x^2$; Sine $\angle$ AEB $= \frac{1}{2}\sqrt{2 \times 1 + 2x\sqrt{1-x^2}}$. Then $1 : b :: x : bx =$ BD: $1-2x^2 : b :: x : \frac{bx}{1-2x^2} = AD$; Conſequently AB $= bx + \frac{bx}{1-2x^2}$; and $\frac{1}{2}\sqrt{2 \times 1 + 2x\sqrt{1-x^2}} : bx + \frac{bx}{1-2x^2} :: 1 : c$; in this Equation the Value of $x = .5515$ the

the Sine of 33° 28. But the eaſieſt Way to ſolve this Queſtion is by Poſition; *ex. gr.* I firſt put the $< BAC = 22° 0'$, and find it too little, then I ſuppoſe it = to 24° 0'. and find it too big: and by the Rule of Proportion, comparing the Errors, I find the true $<$ at A $= 23° 4'$. Hence AC $= 4.259$, AB $= 3.919$ and BC $= 1.669$.

The ſame anſwered by Mr. *William Kingſton*.

It is manifeſt that the two given Lines biſecting their reſpective Angles will interſect in the Center of an inſcribed Circle, whence the Angles formed thereby become known. For as $< CAB + < ACB = 90°$, their $\frac{1}{2}$ Sum is $45° = <$ AFD, whoſe Si - and Coſine call s; and let x and y = Sine and Coſ. of $<$DFP =DCB: Whence the Sine of $<$ AFP $=<$ AEB is expreſſed by $sy + sx$ and by Trig. (making Rad. = 1.) $1 : 4 :: sy + sx : 4sy + 4sx$ = AB: Again, $1 : 2 :: y : 2y$ = BC: Conſequently $\frac{y}{2sy+2sx}$ = Tangent of $\angle$ BAC $= \frac{y^2-x^2}{2xy}$, reduced, becomes $2xy^2 = 2sy^3 - 2syx^2 + 2xy^2 - 2sx^3$, $\therefore \frac{x^3}{y^3} + \frac{x^2}{y^2} + 2s-1 \times \frac{x}{y} = 1$ ſolved, gives $\frac{x}{y}$ = ,661157 = Tangent 33° 28′ 16″. Whence AB = 3.9193 and AC = 4.2595.

The ſame anſwered by Mr. THOMAS COWPER.

Put s = Sine $\angle$ AFD = 45°, x = Sine $\angle$ BCD, and y = that of $\angle$ CDB; then will Sine $2xy$ = Sine of $\angle$ ACB. $y^2 - x^2$ = Sine $\angle$ BAC, and $sx + sy$ = that of $\angle$ AEC. But $2yx : 4 :: sx + sy : \frac{2sx + 2sy}{yx}$ = AC. Again, $y^2 - x^2 : 2 :: y : \frac{2y}{y^2-x^2}$ = AC. Th. $2xy^2 = sy^2x + sy^3 - sx^3 - syx^2$; which divided by xy^2 quotes $s + \frac{sy}{x} - \frac{sx^2}{y^2} - \frac{sx}{y} = 1$, and ſubſtituting t for the Tangent $\frac{x}{y}$ the Equation, after ordering the Terms is, $st^2 + st^2 + t - 4t = s$, which reduced gives t = ,6611571 the Tangent

Tangent of the ∠ DCB = 33° 28′ 15″½. Whence AC = 4.2596. AB = 3.919209, and BC = 1.66833.

Mr. *Edward Croſs*, Mr. *Charles Smith*, Mr. *Tho. Dod*, Mr. *Rob. Robinſon*, Mr. *Tho. Garrard*, Mr. *Tho. Moſs*, Mr. *Joſ. Walker*, and Mr. *William Beril* have all very ingeniouſly ſolved this Queſtion.

Queſt on 64, anſwered by GAMSTON RETFORD.

This Queſtion depends upon Mr. *Gibbon*'s curious Table of Chances, at Pag. 90. N°. 3. of the *Miſcell. Curioſa Mathematica*; where it is evident by Inſpection, that there are 133288 Ways to throw 29 Points with 8 Dice, and 1546328 thoſe of the contrary, conſequently 1679616 the whole Number of Chances; then by Page 91, the Number of Throws required = 8.38321, as is manifeſt by a bare Inſpection of the Table: Or, after we have found the Number of Chances for throwing preciſely 29 with 8 Dice, and thoſe of the contrary, let them be repreſented by a and b reſpectively, and x = the Number of Throws; then by *De Moivre*'s Doctrine of Chance, the Probability that will happen in x Trials will be $\left|\frac{b}{a+b}\right|^x = \frac{1}{2}$, and ſince the Chances are equal,

$x = \frac{\text{Log. } 2.}{\text{Log. } a+b - \text{Log. } b} = 8.38321$, the Number of Throws required.

The ſame anſwered by Mr. THOMAS MOSS.

Let a (at any aſſigned Trial) repreſent the Number of Chances for throwing 29 with 8 Dice, b the Number of Chances for the contrary, and x the required Number of Trials; then the Probability of 29 not happening in x Trials $= \overline{\frac{b}{a+b}}^x$ which taken from $\overline{a+b}^x$ (the whole Number of Chances for happening and failing) leaves $\overline{a+b}^x - \frac{bx}{a+b}x$ for its Probality of happening: Which (*per* Queſt.) is equal to its Probability of failing. Therefore $\overline{a+b}^x - \frac{bx}{a+b}x = \frac{bx}{a+b}x$

$a+$

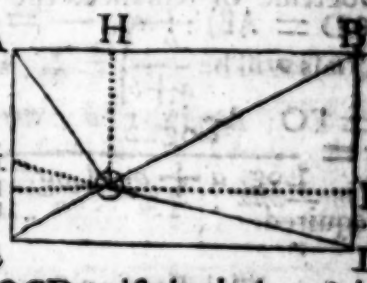
$\therefore \overline{a+b}^{x} = \frac{2b^{x}}{a+c^{x}}$; Therefore x L. $a+b$ = L. 2 + x L. $b - x$ × L. $a+b$, $\therefore x \times 2$ L. $a+b - x$ L. b = L. 2, and $x = \frac{\text{L. } 2}{2\text{ L. } a+b - \text{L. } b} = 8.38321$ the Number of Trials ſought.

Mr. ROB. ROBINSON's Solution to the ſame.

By Prob. 22d of Mr. *Simpſon*'s Laws of Chance, the Number of Chances for throwing 29 is 133288 = A, and that of the contrary is 1546328 = B. Let the Number of Throws = a; then by the 5th Problem of the aforeſaid Author the Probability is $\overline{\frac{B}{A+B}}^{a} = \frac{1}{2}$ ſince the Odds are equal, $\therefore a = \frac{\text{Log. } 2.}{\text{L: A} + \text{B} - \text{L: B}} = 8.3832$ the Number of Throws required.

Queſtion 65 anſwered by Mr. THO. GARRARD.

Put c = AB = CD = 12. m = Sine ∠ AOB, r = ∠ AOC and p & q, b & d, x & y for Sine & Cof. ∠ COD, BOD, ODC



Then (*per Theo.* 1ſt. *p.* 3d. *Thacker's Miſcell.*) we have $py - qx$, and $px + qy$ for the Sine and Cof. ∠ OCD; alſo $bx + dy$ and $by - dx$ for Sine and Cof. ∠ OBD: and (by *Trigonometry*) $p : c :: py - qx : \frac{cpy - cqx}{p}$ = OD, and $bx + dy : \frac{cby - cqx}{p} :: b : \frac{cbpy - bcqx}{pbx + pdy}$ = BD = AC. Again, $m : c :: by - dx : \frac{cby - cdx}{m}$ = AE, and $py + qx : \frac{cby - cdx}{m} :: r : \frac{rcby - rcdx}{mpy + mqx}$ = BD = AC. $\therefore \frac{rcby - rcdx}{mpy + mqx} = \frac{bcpy - bcqx}{pbx + pdy}$ this Equation ordered, &c. will become $x^2 + \frac{b^2rp - d^2rp + q^2bm - b^2pm}{bqm - ordp} = y^2$, and dividing by y^2 and ſubſtituting a for the Coefficient of xy,

we

we have $\frac{x^2}{y^2} + \frac{ax}{y} = 1$; and compleating the Square, &c.

$\frac{x}{y} = \sqrt{1+\frac{a^2}{4}} - \frac{a}{2} = ,24972'92$ the Tangent of 14° 1' 17" 24"', whence all the Angles are known: And by *Trigonometry* the End AC = BD = 6.4919 and conſequently the Area of the Field 77.903 Chains.

The ſame anſwered by *Charles Smith*.

In the Oblong ABCD, O is the Spring (or Place of Obſervation) continue the Line DO to G; then the ∠ AOG = 34° 45', Sine and Coſ. = p and q: the ∠ GOC = 41° 15", Sine and Coſ. = s, and c; m and n thoſe of the ∠ BOD = 43°: r = Sine 102° 15' = ∠ AOB; and let x and y = Sine and Coſine of ∠ FOD = ∠ GDC: Then will $cy + sx$, $qy - px$, and $my - nx$, expreſs the Coſines of the Angles EOC, AOE, and BOH, reſpectively, *per* Trigonom. as $s : b$ (1200 = CD = AB) :: $x : \frac{bx}{s}$ = CO and $1 : \frac{bx}{s}$ :: $cy + sx : \frac{bx \times cy + sx}{s}$ = EO: Again, $r : b$ :: $my - nx : \frac{bmy - bnx}{r}$ = AO and $1 : \frac{bmy - bnx}{r}$ :: $qy - px : \frac{a - bx \times bmy - bnx}{r} = EO = bx \times cy + sx$,

and by Subſtitution and proper Reduction $x4 - x^2 = -,05525627\,1068$, and the required Value of $x^2 = ,0587023$ ∴ $2x^2 = ,1174046$ = the verſed Sine of 28° 2' 34", the half of which is 14° 1' 17" = ∠ GDC. Hence AC = BD = 636 Links (*per* Gunter) and the Area = 7A. 3R. 21 P. Q. E. F.

The ſame anſwered by Mr. *Thomas Cowper*.

Let a = Sine and b = Coſine ∠ BOD. = 43°, s = Sine c = Coſine ∠ AOB = 102° 15', d = Sine n = Coſine ∠ AOC = 76, x and y = Sine and Coſine of the ∠ OAB. and l = AB = 12: Then by adding and ſubtracting the Sines, &c. of the ∠ s we have $sy - cx$ = Sine ∠ ABO and $sx + cy$ = Coſine; $dx + ny$ = S. ∠ ACO and $bsx + bcy + asy - acx$ = S. ∠ BDO, then (*per* Trig.) $s : l$ :: $x : \frac{xl}{s}$ = BO; and $s : l$ :: $sy - cx$

$-cx : \frac{lsy-lcx}{s}$ = AO; Again $dx+ny : \frac{lsy-lx}{s} :: d :$ $\frac{dlsy-dlcx}{dsx+nsy}$ = AC; Laſtly, $bsx+bcy+asy-acx : \frac{bx}{s} :: a :$ $\frac{alx}{bs^2x+bcsy+as^2y-acsx}$ = BD = AC. Therefore $\frac{ax}{bsx+bcy+asy-acx} = \frac{dsy-dcx.}{dx+ny}$. That is * $adx^2+anxy = bds^2xy+bdcsy^2+ads^2y^2-adcsxy-bdscx^2-bdc^2xy-adscxy+adc^2x^2$, and dividing all by xy, writing t for $\frac{x}{y}$ and ordering the Terms, we have $adt^2+bdsct^2-adc^2t^2+ant+2adsct+bdc^2t-bds^2t = bdsc+ads^2$, which divided s $t^2+\frac{ant+2adsct+bdc^2t-bds^2t}{ad+bdsc-adc^2} = \frac{bdsc+ads^2}{ad+bdsc-adc^2} = 1.$

And ſubſtituting $2p$ for $\frac{an+2adsc+bdc^2-bds^2}{ad+bdsc-adc^2}$, it will Be $t^2-2pt = 1$. Solved $t = \sqrt{1+p^2}+p = 1.1411436$ the Tangent of the $\angle$ BAO = 48° 46′ 17″, thence the Breadth AC = 6 491897, and the Area = 7A. 3R. 6P. 444.

But this may be ſolved by a ſimple Equation as follows, viz. from the above Equation marked thus * we have $adx^2+bdscx^2-adc^2x^2-bdcsy^2-ads^2y^2 = bds^2-2adsc-bdc^2-anxxy$, and by Diviſ. &c. we have $\frac{y^2-x^2}{2xy} = \frac{an+s^2-c^2\times bd+2adsc}{2bdsc=2ads^2}$

$= \frac{\frac{an}{bd}+c^2-s^2+\frac{2a}{b}sc}{2sc+\frac{2a}{b}s^2} = \frac{tr-v+2tsc}{2sc+2ts^2} = -.1324144$

= Tangent 7° 32′ 34″, or Cotangent of 82° 27′ 26″, whoſe Supplement to 180° is 97° 32′ 34″, half of which is 48° 46′ 17″ = < BAO as before.

N.B. $t = \frac{a}{b}$ = Tangent 43°, $r = \frac{n}{d}$ = Tangent 14°, and $-v = c^2-s^2$ = the Coſine of an Arc double to that which s is the Sine of, *i.e.* = Coſine 24° 36′.

Mr.

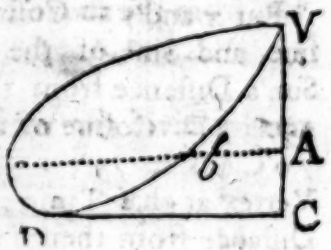
Mr. *Robert Robinson* the Proposer, Mr. *Tho. Dod*, Mr *James Elgar*, and Mr. *Tho. Moss*, Mr. *Jos. Walker* have all favoured us with very accurate Solutions to this Question.

Question 66 answered by Mr. JOHN TURNER.

The given Equation of the Curve is $x^4 + y^2 = 40xy$ $= 2bxy$, or $y^2 - 2bxy = -x^4$. Hence $y = bx \mp \sqrt{b^2x^2 - x^4}$; therefore its Fluxion $b\dot{x} \pm \frac{b^2x\dot{x} + 2x\dot{x}}{\sqrt{b^2x - x^2}} = 0$ reduced $x^2 = 2b \times 7.5 = 300$; and $x = 17.32$. Consequently $y = \begin{cases} 173.2 \\ 519.6 \end{cases}$ the greatest Ordinate. Again, $y\dot{x}$ = Fluxion of the Curves, Area $= bx\dot{x} \mp \dot{x}\sqrt{b^2x^2 - x^4}$, whose Fluent is $\frac{1}{2}\ bxx \pm \frac{\sqrt{b^2 + x^2}}{3} \sqrt{b^2 - x^2}$, now when $x = 173.2$, the Area, $= \begin{cases} 666.66, \&c. \\ 5333.33, \&c. \end{cases}$

Mr. ROB. ROBINSON's Solution to the same.

Since $x^4 + y^2 = 40xy \therefore y = 20x \pm \sqrt{400 - x^2}$, and $\dot{y} = 20\dot{x} \mp \frac{400\dot{x} - 2x^2\dot{x}}{\sqrt{400 - x^2}} = 0$, this reduced is $x = 10\sqrt{3} = AV$, and $y = 300\sqrt{3} = 519,615242$ the greatest Ordinate: Again $y\dot{x} = 20x\dot{x} \mp x\dot{x}\sqrt{400 - x^2}$, whose Fluent is $10x^2 \pm \frac{400 - x^2)^{\frac{3}{2}}}{-3}$, which being corrected gives $10x^2 \pm 800 \mp \frac{400 - x^2)^{\frac{3}{2}}}{3} =$ the Area



where the upper Sine belongs to the Concave and the under to the Convex Curve. COROL. Hence the Area of any Part VB*b*V is $\frac{1}{3} \times 800 - 400 - x^2)^{\frac{3}{2}}$ and in this Case where the greatest Abscissa VC = 20, is $5333\frac{1}{3}$ = the Area VBD*b*V.

The

The ſame anſwered by Mr. PAUL SHARP.

Given $x^4+y^2=40xy \therefore y=20x \pm x\sqrt{400-x^2}$. Whence the Fluxion of the Area is $y\dot{x}=20x\dot{x} \pm x\dot{x}\sqrt{400-x^2}$, the correct Fluxent of which is $2666\frac{2}{3}+10x^2+\frac{x^2-400}{3}\times\sqrt{400-x^2}$ = the ſaid Area. Secondly, For the greateſt Or nate. The Equation in Fluxions $4x^3\dot{x}+2y\dot{y}=40x\dot{y}+40y\dot{x}$, $\therefore 2x^3\dot{x}-20y\dot{x}=20x\dot{y}-y\dot{y}$. Whence $\frac{2x^3\dot{x}-20y\dot{x}}{2x-y}=\dot{y}=0$ (*per* Queſt.) $\therefore 4=\frac{x^3}{10}$ which ſubſtituted for y in Equation of the Curve gives $x^4+\frac{x^6}{100}=4x^4 \therefore 100+x^2=400$, whence $x=\sqrt{300}=17.3205$ and $y=519.615$. Q. E. I.

This Queſtion was alſo very methodically ſolved by Mr. *William Sutton*, Mr. *Charles Smith*, Mr. *John Hollingworth*, Mr. *George Stapley*, Mr. *Thomas Moſs*, and others, as may be ſeen in the Catalogue.

Queſtion 67 anſwered by Mr. WILLIAM SUTTON.

Put x and y = Coſine and Sine of the Lat. z and n = Coſine and Sine of the Sun's Declination, d = Coſine of the Sun's Diſtance from the Meridian when Twilight begins = 150°, t = Coſine of the Sun's Diſtance from the Meridian at 7 o'Clock = 75°, c = Coſine of the Sun's Diſtance from the Vertex at that Time = 64° 17′, and r = Coſine of the Sun's Diſtance from thence when Twilight begins = 108°. Then from Spherics ariſe theſe two Equations, $xzd-ny=r$, and $xzt+ny=c$, and taking the former of theſe Equations from the latter, we have $xz=\frac{r+c}{d+t}$ the Rect. of the Sines Comp. of the Lat. and Declin. and by ſubſtituting the Value of xz in the latter Equation we have $ny=\frac{cd-tr}{d+t}$ the Rectangle of the Coſines. Whence $xz+ny=\frac{r+c+cd-tr}{d+t}=$

Coſine

Cosine of the Diff. of the Lat. and Declination: Also $ny - xz = \frac{cd - tr - ry - c}{d + r}$ = Cosine of the Sum of the Latit. and Declin. Whence the Lat. 44° 34′ and Declin. 22° 0′ answering *May* 20.

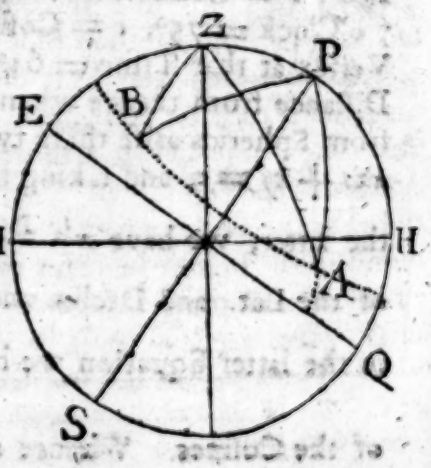
The same answered by Mr. Tho. Cowper the Proposer.

Let a express the Sine of the Sun's Altitude at 7, b the Cosine of the Hour from Noon, c the Sine of the Hour from Midnight at Day-break, d the Sine of 18° the Sun's Depression, x and y the Sine and Cosine of Lat. and e and v those of the Sun's Declination. By the common Spheric Theorem I find $bvy + ex = a$, and $cvy - ex = d$, then in the 1st Equation writing $cvy - d$ for ex, it is $vy = \frac{a+d}{b+c}$, and in the other Substitute, $\frac{a+d}{b+c}$ for vy, we have $\frac{ca-bd}{b+c}$.

$ex : vy + ex = \frac{a+d+ca-bd}{b+c} = .923457$ the Sine of the Sun's Merid. Altitude = 67° 26′ 12″, and $vy - ex = \frac{a+d+bd-ca}{b+c} = .3975047$ the Sine of the Sun's Depression at Midnight = 23° 25′ 20″; whence the Lat. is found = 44° 34′ 14″, and Sun's Declin. = 22° 0′ 26″, answering the 21st Day of *May* 1746.

The same answered by Mr. *Robert Robinson*.

Here is given $\angle ZPA = 150°$ Cosine $= m$, $\angle BPZ = 75°$ Cosine $= n$. $ZA = 108$ Cosine $= a$, $BZ = 64° 17'$, Cosine $= d$; let x = Sine, y = Cosine Lat. v = Sine, z = Cosine Sun's Declination; then will $myz - vx = a$, and $nyz + vx = d$, hence $yz = \frac{d+a}{m+n}$, and $xv = \frac{md-na}{m+n}$,



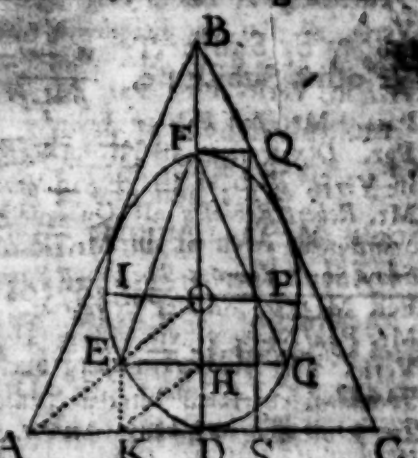
conse-

consequently the Cos. of the Lat. and Declin. is $\frac{+d+s+nd+ns}{m+n}$ $=$,3975046 $=$ Cosine of 66° 34′ 40″; and the Cosine of their Diff. is $\frac{d+s+nd+ns}{m+n}$ $=$,9234570 $=$ Cosine of 22° 33′ 48″; hence the Lat. is 44° 34′ 14″, and the Sun's Declination is 22° 0′ 26″, answering to *May* 21. the Day of Observation.

We have also received very accurate and concise Solutions to this Question from Mr. *Charles Smith*, Mr. *Geo. Stapley*, Mr. *James Elgar*, Mr. *Tho. Moss*, and several others.

Question 68. answered by Mr. *William Sutton*.

In order to demonstrate this by Lines 'tis proper to consider that there is the same Affinity between the Parallelogram circumscribed about, and inscrib'd in an Elipse, as there is between the Square about, and inscrib'd in a Circle; and that because their Areas are proportional to the Rectangles of their Diameters (see *Ward*'s 1st Ed. p. 407.) From whence it follows, that not only their Squares and Parallels inscrib'd and circumscrib'd are each Proportional (*viz.* as the Squ. of their Sides belonging to each Fig.) But also the Areas of their inscrib'd and circumscrib'd Triangles are similar and as the Squ. of their Sides. Therefore the Areas of the greatest inscribed and least circumscribed Triangles about a Circle will each be equilateral, similar, and as the Squares of their Sides, one being a fourth Part of the other. Also the Areas of those about an Elipse will be similar and iscoceles, and that the one is a fourth Part of the other, may be thus demonstrated. It may be easily proved that the Base of the greatest inscribed Triangle bisects equally the Semi Transverse OD in H, draw the Line AO, which by Reason of the Similarity of the Triangles AOD and EOH, as also the equal Bisection of OD in H will pass through the Point E; let fall EK parallel to HD and draw KH, then will the Triang. AOD be divided into four Similar Triang. whose Areas are all equal; for



EH = KD and EK = HD, and AK is parallel to EH with the Side EK = HD. Th. they are all equal, four of which Triangles belong to the circumſcribing Triangle, and one to the inſcribed one. Th. the Triangle EFG = $\frac{1}{4}$ of the Triangle ABC. Q. E. D.

The ſame anſwered by Mr. *John Turner*.

Let FD = 80 = t, IP = 6 = c, FH = x, DH = $t - x$; as $t^2 : c^2 :: tx - x^2 : \overline{EH}^2$, by Property of the Elipſis and $x\sqrt{c^2tx - c^2x^2}$ is to be a Maximum. *Ergo* its Fluxion $3c^2tx^2\dot{x} - 4c^2x^3\dot{x} = 0$; $x = \frac{3}{4}t$ = FH = 6, EG = 51.9615 and the Area = 1558.845. Secondly, Let DF = t PO = b DC = x; then by Property of the Elipſis FQ = $\frac{b^2}{x}$, and CS = $\frac{x^2 - b^2}{x}$; now by Similar Triangles $\frac{x^2 - b^2}{x} : t :: x : \frac{tx^2}{x^2 - b^2}$, which multiplied by x gives $\frac{tx^3}{x^2 - b^2}$ a Minimum its Fluxion $tx^4\dot{x} = 3tb^2x^2\dot{x}$; hence $x = b\sqrt{3}$ AC = 103.923, DB = 120, and the Area of the leaſt circumſcribing Triangle = 6235.38. That is the Area of the Triangle EFG = $\frac{3}{16}tc\sqrt{3}$; and the Area of the Triangle ABC = $\frac{3}{4}tc\sqrt{3}$ equal to 4 times the Area of the former, and ſo it will be in any Elipſis whatſoever.

The ſame anſwered by Mr. *Paul Sharp*.

Draw the Elipſis, and ſuppoſe ABC and EFG to be the circumſcribing and inſcribed Triangles required. Put the tranſverſe Axis = $2a$ = 80, conjugate = $2b$ = 6; and FH = v: Then *per* Conics $\frac{b}{a}\sqrt{2av - v^2}$ = the Area of the Triangle EFG, a Max. (*per* Queſt.) $\therefore 6av^2\dot{v} - 4v^3\dot{v} = 0$. Whence $v = \frac{3a}{2} = 60$, and $\frac{b}{a}\sqrt{2av - v^2} = \frac{b}{2}\sqrt{3}$ which multiplied by $\frac{3a}{2}$ gives $\frac{3}{4}ab\sqrt{3} = 1558{,}845$, for the Area of the Triangle inſcribed.

Again, Draw FQ parallel to DC, which call y, then (*per* Conics) $\frac{b^2}{x} = DC = DG$; but $DC = x$, then (*per* 4. E 6.)

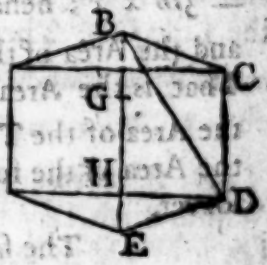
E 6.) $x - 2a : y :: x : \frac{b^2}{y} y \therefore x = \frac{2ab^2}{b^2 y - y^3} = BD$, whence $BD \times AD = \frac{2ab^4}{b^2 y - y^3}$ a Minimum (*per* Queſt.) $\therefore 3y^4 - b^2 y^2 = 0$, whence $y = \frac{b}{\sqrt{3}} \therefore \frac{b^2}{y} = b\sqrt{3}$, and $3a = \frac{2ab^2}{b^2 - y^2} = x = 120$. Conſequently $3ab\sqrt{3} = 6235.38$ = the Area of the leaſt circumſcribing Triangle, which is evidently equal four times the Area of the greateſt inſcribed one. Q. E. D.

We received Solutions to this Queſtion from Mr. *Charles Smith*, Mr. *Geo. Stapley*, Mr. *Tho. Moſs*, Mr. *W. Bevil*, Mr. *Tho. Cowper*, and Mr. *W. Kingſtone*.

Queſtion 69. anſwered by Mr. *James Terey*, Shipright, the Propoſer.

There was a Miſtake in this Queſtion, as printed in the laſt Year's Diary. The Length ought to have been multiplied by two Tenths inſtead of Two. Then

Let the Diagonal $BD = d = 30,0,2 = b$, and $\frac{1}{2}$ the Length $= AG = GC = x$; then $bx = BG$, and $\sqrt{d^2 - x^2} = BH$, whence $\sqrt{d^2 - x^2} + bx = BE$ and $\sqrt{d^2 - x^2} - bx = DC$ and (by a common *Theor*) $\frac{\overline{BE}^2 + BE \times CD + \overline{CD}^2 \times}{1077.15}$



AC = Content in Ale Gallons, *i. e.* $\frac{bbxx + 3dd - 3x^2 \times 2x}{1077.15}$ the Content which *per* Queſtion is to be a *Max.* in Fluxions $3b^2x^2\dot{x} + 3d^2\dot{x} - 9x^2\dot{x} = 0$, whence $x = d\sqrt{\frac{1}{3 - b^2}} = 1.74371 = GC$, $BE = 27.8994$ $CD = 20.9245$, and the Content 58.2777 Ale Gallons.

Queſtion 70. ſolved by the Propoſer.

The given Equation is $y = rxzz$: This in Fluxions is $\dot{y} = r^2\dot{x} + 2rxz\dot{z}$. But $\sqrt{\frac{a\dot{x}}{2ax - x^2}} = \dot{z} \therefore \dot{y} = r\dot{x}^2\dot{x} + \sqrt{\frac{2ra^2x\dot{x}\dot{x}}{2ax - x^2}}$ = the Fluxion of Aq (ſee *Fig.* in laſt Year's

Diary, pag. 41.) which multiplied by qM or x gives $yx = rz^2xx + \frac{2razx^2\dot{x}}{\sqrt{2ax-x^2}}$ = the Fluxion of the Space AqM; and if $\sqrt{2ax-x^2}$, or Pm, be put $= v$; the Fluent of yx will be found $\frac{rx^2z2}{2} + \frac{3ra^2z^2}{4} - \frac{rax2v-3ra^2zv}{2} + \frac{ra^2x^2}{4} = \frac{3ra^3x}{2}$ = the Area of the Curve AqM. Q. E. I.

I. PARADOX, anſwered by Mr. *J. Hollingworth.*

If a Diagonal we take
And note the ſame for Method's Sake,
And alſo find the Angle B:
There needeth no Plurality:
The other Parts from hence are found;
And Area of this oblong Ground.

The ſame anſwered by Mr. *James Elgar.*

Let A B C D be the Oblong. Meaſure the Diagonal C B, and with a Square find where the Perpendicular P D falls on the Line C B. Then will C P x B P = $\overline{\text{P D}}^2$. Hence the Area may be found.

II. PARADOX, anſwered by Mr. *William Jepſon.*

Mr. *Atkinſon* doats on a charming young Fair,
Whoſe Birth-Day fell out in a *Biſſextile* Year *. * [29 *Feb.*]
Let him add to her 90 Pounds one Cypher more,
And he'll find her more charming ten times than before.

We again return Thanks to our kind Contributors, hoping they will continue their Favours as uſual: But muſt beg Leave to acquaint them, that our dropping the Publication of the *Supplement*, was entirely owing to the publiſhing of a SHAM Supplement the laſt Year, *i. e.* 1746, by a Society of *Gentlemen* (as they called themſelves) who always took the Freedom of opening all the Letters, before they came to our Hands; and very probably of keeping ſome to themſelves.

Anſwers to the ÆNIGMAS in laſt Year's Diary.

I. The GOUT.
II. FLAX.
III. An AUGER or GIMLET.
IV. A GUINEA.
V. A CLOUD.
VI. HEALTH.
VII. A GRINDSTONE.
VIII. A DRE[illegible]G-BOX.

All the ÆNIGMAS answered by Mr. SAM. BAMFIELD, *Writing-Master* and *Teacher* of the *Mathematics* at *Honiton* in *Devonshire*, in a Letter to Mr. JEPSON.

BLEST Advocate —— thine Eloquence
Has driven *Chloe*'s Scornings hence,
Tho' she does matchless shine;
And tho' her Heart was stubborn grown,
Hard as the Adamantine STONE, 7.
This Gem of GOLD's now mine 4.
The pungent Pains for her I BORE, 3.
Remotely are exil'd and o'er;
No more black CLOUDS are seen; 5.
But Beauty's FLOURISH-HEALTH appears; 8. 6.
Incessant Joy still crowns her Years,
And all's serene within.
The loveliest *Nymph* e'er deck'd the Plain:
Tell him she scorns his spiteful Strain,
And him (as FLAX) defies. 2.
Go, UTTER this—be not dismay'd 1.
At what old *Jobbernowle* display'd,
Striving t' anatomize.

All the ÆNIGMAS answer'd by Mr. *William Mobbs*.

Bamfield tho' soaring in a CLOUD, 5.
Like *Phaeton* may fall;
The GOUT make *Hulse* to cry aloud 1.
The AUGER tire *Hall*. 3.
Hammond his GUINEA nicely coins, 4.
Mason the GRINDSTONE twirls; 7.
Mamma's dear *Joye* her FLAX well twines 2.
For she's the best of Girls.
Heaford doth handle well his BOX, 8.
While dredging of the Meat;
And *Moore's* contented with his HEALTH, 6.
If little he has to eat.

Answered by Mr. *James Hall*.

In answ'ring your Riddles, (since b' answer'd they must)
Suppose I begin with the PEPPER-BOX first. 8.
Then a CLOUD, FLAX and NAIL-PASSER well may be reckon'd 5. 2. 3.
To pass for true Answers to Fifth, Third, and Second.
Friend *Hammond's* dress't up here as smart as a GUINEA; 4.
But fie, Sir, what Business have Poets with Money?

Have a Care of your HEALTHS, for it seems past all Doubt, 6.
That our old Correspondent's been twing'd with the GOUT! 1.
If the Seventh's a GRINDSTONE, as this I have a Notion, 7.
Then ev'ry Ænigma will have a Solution.

All the ÆNIGMAS answer'd by *Mr. Edward Lashmar.*

The GOUT, an AUGER, and the FLAX 1. 3. 2.
A GRINDSTONE and a GUINEA 7. 4.
Will solve, I think, Ænigmas Five,
If I of Skill have any.
Now let me wish each Seedsman HEALTH, 6.
Expect from CLOUD a Show'r, 5.
That Men may fill their Sacks with Corn,
And Maids their BOX with FLOUR.

Ænigmas answer'd in the Field
Where *Phœbe* did to *Collin* yield. } By *J. Jobbernowle.*
Enjoying HEALTH and crown'd with FLAXEN Hair, 6. 2.
To th' Flow'ry Fields fair *Phœbe* did repair.
Young *Collin* from his GRINDING-STONE, did spy 7.
The charming *Phœbe*, as she passed by.
He that with AUGER pierc'd the Ash and Yew, 3.
A Dart from *Phœbe*'s Eyes did pierce him through!
The pensive Youth b'ing eager to aspire
Threw * GOUTY-*Besse's* DREDGER in the Fire! } 1. 8.
And thus address'd the *Nymph* he did admire:
Deign to be kind, sweet Mistress of my Heart,
Nor Bags of GOLD can cure the pungent Smart: 4.
As vernal SHOWERS refresh the thirsty Plain 5.
One balmy Smile can chear thy drooping Swain.
Phœbe reply'd — To a yielding Heart
Plain Words well tim'd more pleasing Sweets impart, }
Than all the Flow'rs of Rhetoric or Art.

* Gouty *Besi*, a Cook-Maid, in Love with *Collin.*

All the ÆNIGMAS answered by Mr. *David Harris.*
Addressed to Mr. *James Hall.*

What Store of Joy, without Annoy, do a Country Life embellish!
Dear Sir, I find, this Morning's Wind has WHET me to a Relish. 7.
There's Comfort sure in being poor, cou'd we but right apply it;
I know not why ('twixt you and I) so few do chuse to try it.
The CLOUDY Great, in GILDED State, lie tortur'd with the GOUT, Sir, 5. 4. 1.
If Honour's Reign's so full of Pain, 'tis best to live without, Sir;
Let City-Beaux, in POWDER'd Cloaths and FLAXEN Tye-whigs, strut it, 8. 2.
We Country-Swains, in humble Strains, to our own Music foot it;
We ask not Store of *Indian* Ore, or Gems in our possessing;
Here we have HEALTH, which PASSES Wealth, and that's the greatest
Blessing. 6. 3.

Answered by Mr. *Samuel Hammond*.

A GUINEA, GIMBLE, FLAX and HEALTH,
(Which is of more Account than Wealth)
A GRINDSTONE, DREDGER, CLOUD, and GOUT,
Do solve the Ænigmas past all Doubt.

Answered by Mr. *John Thorp*.

If I guess right I truly think
A GRINDSTONE, WIMBLE, FLAX, and CHINK;
A DREDGER, HEALTH, a CLOUD and GOUT,
Will solve all right, if not, I'm out.

After the same Manner they were all answered by *Don Quixote*, *St. Chad*, *Molly Restless*, *Rusticus*, Captain *Bustle*, Mr. *R. Hulse*, Mr. *Tho. Dod*, The *proud Salopian*, Mr. *Thomas Allen*, Mr. *William Bird*, Mr. *John Bevil*, Mr. *William Dyke*, Mr. *William Heaford*, Mr. *James Mayo*, Mr. *William Pommells*, Mr. *William Jepson*, Mr. *Jos. Walker*, Mr. *William Bevil*, Mr. *Peter Door*, Mr. *John Williams*, jun. Mr. *George Harwell*, Mr. *Stephen Hubbard*, Mr. *Tho. Smith*, *Chagford in Hill*, and others, as may be seen in the Catalogue.

PARADOX I. by Mr. *Thomas Smith*.

There is a Family, I do declare,
Lives in a certain Town in *Staffordshire*,
Consisting of one Man who there does dwell;
Two Women also, if I the Truth may tell:
And Children they have Two to their Desire;
But how they are of kin if you require,
I will endeavour to relate the Truth,
Tho' it may seem to you to be uncouth.
The Man's a loving Father and Son dear
To one o'th' Women, (I for Truth declare,)
Likewise a Grandfather, and Husband kind
Unto the other Woman, as we find:
And also Great-Grandfather (he is then)
Unto those pretty Babes his Children.
If you can make this out pray don't forbear;
But tell how it can be another Year?

PARADOX II. by Mr. *Samuel Hammond*.

As I amusing on my Bed at dead of Night did lie,
I counted Twelve, struck by a Clock that stood in Steeple high;
But tho' I reckon'd ev'ry Stroke, in Order one by one,
As soon as heard, e're I began to count the Clock had done.

Instead of saying (with a Smile) This Thing can never be,
The seeming Falsehood reconcile, which is from Quibble free.

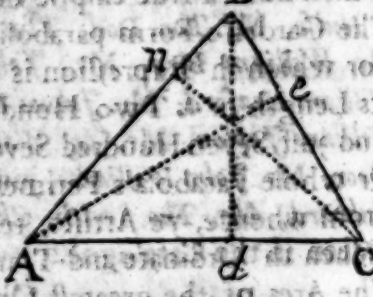
ARBUS, by the same.

A Deniak, a T, and the Name of a Metal,
And what *Roger* oft says at Plow to his Cattle,
Together with Part of a Swine, do compose
The Name of a Town; which I beg you'll disclose.

New MATHEMATICAL QUESTIONS *to be answered in the next* Year's Diary.

(1.) Question 71. by Mr. *William Sutton*.

WHEN I went to survey the Triangular Field A B C with only a Cross-Staff and *Gunter*'s Chain; I found $An = 5.18\frac{1}{4}$ Chains, $Be = 2.50$, $Cd = 5.85$; and the Angles AnC, BeA and CdB all Right ones. *Quere* the Area and Sides of the Field.



(2.) Question 72. by Mr. *Robert Williams*.

In a Parabola whose Equation is $ax = y^2$, is given the Axis $= 40$, and the Proportion of the Diameters of its circumscribing and inscribed Circles as 1,8125 to 1. Required the greatest Ordinate of the Parabola; and the Diameters of its circumscribing and inscribed Circles?

(3.) Question 73, by Mr. *Thomas Cowpen*.

'Tis requir'd to define the Depth of a Mine,
Wherein a Ton Weight of its Ore
By Gravity's found to weigh six half Pounds { lb.
And likewise three Quarters more. { $3\frac{3}{4}$ *Averd.*
Than the same will on the Top of a Hill,
(Extended aloft in the Air)
Whose Summit we know from the Cavern below,
* Three Miles and three Quarters declare?
What the said Weight will weigh at both Places display,
Or what Force to raise it will do;
And also account the Height of the Mount
From the Earth on this Principle too?

* *The perpendicular Distance from the Top of the Mount to the Bottom of the Mine, allowing the Semidiameter of the Earth = 4000 Miles.*

(4.) Quest.

(4.) Question 74. by Mr. *William Tesson.*

A Merchant having order'd his Cooper to make him a parcel of Casks of the second Variety, to hold 126 W. G. each, in such a Manner that the Head Diameter may be $\frac{3}{5}$ of the Bung, and the Diagonal $\frac{3}{4}$ of the Length, desires some ingenious Gentleman to send him the Dimensions in the next Year's Diary?

(5.) Question 75. by Mr. *William Bevil.*

Given $x^{x^x} = 27\frac{1}{3}\frac{7}{0} + 2x$; Quere x, with the Investigation.

(6.) Question 76. by Mr. *Samuel Bamfield.*

There is a Garden, with a Reservoir
Which doth a true elliptic Form acquire;
The Garden's Form parabolic I find
For which th' Expression is [$ax = y^3$] the Cubic Kind;
Its Length or x Two Hundred Yards is found,
And just Seven Hundred Seventy-six the Bound
Or whole Parabola's Perimeter round:
From whence, ye Artists, tell these Questions three
(When th' Ordinate and Transverse Parallel be)
The Area of the greatest Oblong can
Be e'er inscrib'd in this Parabolic Plan;
The Transverse and the Conjugate likewise
Of this Canal when't the Oblong [illegible]
In like Proportion you [illegible]
Supposing 't doth to one Tenth Part amount;
The Fountain's Center from the Vertex too,
Which now is all that is requir'd to do.

N. B. *The foregoing Question was introduced with an elegant Description of the natural and artifical Beauties of the Garden; which, for want of Room, we were with Reluctance obliged to omit.*

(7.) Question 77. by Mr. *Robert Robinson.*

Soon as the Dawn had cast its lucid Grey
O'er all the East and promis'd shining Day;
From Bed I rose and saddled my Steed,
And as bright *Sol* did rise set out with Speed:
* South-East ten † Miles *per* Hour I did survey
The Orb Terrene, choosing the nighest Way;

* *On the Arch of a great Circle making an Angle of* 45° *with the Meridian departed from.*

† *Sexagenary Miles, or* 60 *to a Degree.*

My

My Journey did compleat as th' Clock ſtruck Ten,
And found the Latitude I was in then,
Fifty Degrees and Minutes Twenty-three: 50° 23′ N.
How far I rode, Artiſts, pray tell to me?

(8.) Queſtion 78. by *Gamſon Retford*.

I demand a Geometrical Demonſtration of the Proportion of the Diminution of the Concentrifugal Force in all Latitudes.

(9.) Queſtion 79. by Mr. *Paul Sharp*.

Suppoſe a Tower 126.125 Feet high, ſtanding perpendicular to the Plane of the Horizon, at a certain Place in North-Latitude, on a certain Day of the Year 1749, with the Shadow of its Top traces out the Curve of a Parabola = 39.24716 Chains (*per Gunter*). And Area included by the ſaid Curve and bounding Ordinate = 230.4 ſquare Chains = 23 A. 0 R. 6.4 P. Now by this Data, I hope ſome ingenious Gentleman, in the next Diary, will find the Latitude of the Place and Day when this will happen.

(10.) Queſtion 80. by Mr. *Thomas Moſs*.

In a certain Place in North-Latitude, *May* the tenth, the Sum of the Sun's Amplitude, and its Azimuth from the Eaſt or Weſt at ſix of the Clock was obſerved to be 47° 15′: 'Tis required (by a ſimple Equation) to find in what Latitude theſe Obſervations were made?

New Ænigmas to be anſwered next Year.

(1.) Ænigma 45. by Mr. *Samuel Bamfield*.

TOO clearly I wou'd not myſelf reveal,
But what is ſo conſpicuous can't conceal;
Yet to no *Kingdom* e'er can be confin'd;
I am impower'd to viſit all *Mankind*:
The *Jew*, the *Chriſtian*; *Emperor* and *Slave*,
In juſt Proportion my ſweet Affluence have:
(And by all Gain an univerſal Praiſe,
'Cauſe I aſſiſt ten thouſand different Ways)
All from the *loweſt* up to *Crowned-Head*
With my Benignity are daily fed:
Help'd matchleſs *Pope*, on *Man* (if to his Coſt)
Yet not great *Milton* in his *Paradiſe Loſt*;
Brought Luſtre to fair *Roſ'mond*'s ſplendid Charms,
And caus'd th' Attraction to her *Monarch's* Arms.

For

For she had never such Distinction made
Had I not kindly lent my powerful Aid,
I such inestimable *Bliss* bestow,
Those few that don't, wou'd fain the *Blessing* know;
Yet tho' so highly priz'd by ev'ry one,
The youthful am'rous Lovers oft me shun.
So great's my Power I've this whole Realm possest,
And am most rightly deem'd a welcome Guest;
But transient is my chearful, welcome Reign;
Long at one Place not destin'd to remain:
For I've a constant, and pursuing Foe;
That does expel me whereso'er I go,
'Tis true I am with diff'rent Strength array'd,
But what above already is display'd;
From the great *Fount-Original* proceeds,
Which justly is esteem'd for mighty Deeds.
But diff'rent Fountains diff'rent Streams must have,
So somewhat diff'rent Names to me are gave:
Oft I'm by an inferiour Traveller sent,
Tho' that is borrow'd first, before 'tis lent;
From a small num'rous Race likewise outgo,
But then, alas! I'm faint, imperfect too:
Nay further yet; some other Helps you see,
And all contribute to the making me.
But Artists, now I fear I've been too bold,
Because I must assist e're you will me unfold.

(2.) Ænigma 46. by *Chagfordian Hill.*

GENTLEMEN,

'Tis not to you alone I owe my Birth,
'Tis all Mankind in general, whom I
Claim for my Parents——'tis to you,
You who contribute to this Diary,
I for my Name appeal; therefore explore:
Of Elements the weakest I consist,
Am in Production easy, faint, and weak,
No sooner born than bury'd, quite extinct,
Tho' so short-liv'd, in Birth I've Power to charm
The most discreet, precise of human Race;
Both high and low, both rich and poor, are all
At Times by me infatuated; and
As tho' asham'd, eclipse my infant Birth,

Who

Who e'er does not quite are they inurbane;
In Company if 'tis especially.
I oft am seen begetting, then beget
In you a second Being, then am lost
If no identic Person's near at Hand
To catch me (fond Illusion) as I fly;
So singular I am, 'tis somewhat strange
Philosophy for me shou'd not account;
" Philosophy! which, by Gradation just,
" Searches, explains, the most minute Recess
" Of what's create, of me says nought; therefore
" Excusable in me the more it is,
" T'endeavour thus to raise my Fame, that is
" A Name in History, which may, which shall,
" To future Ages be tradition'd down."
Sometimes I seem to look like Innocence;
Look as I will I'm bred of Indolence:
" Why ay, that's right, I'd quite forgot to rhyme;
" And now must leave it 'till another Time,
" Only take this Hint more———
" 'Tis what we all beget without apparent Reason,
" The which is hard t' assign, sometimes 'tis out of Season."

(3.) ÆNIGMA 47. by Mr. *Ant. Moore.*

Ye prying Sirs! against whose piercing Sense
The deepest Myst'ry proves a weak Defence;
Attend the Song. For know my powerful Sway
E'en Kings as well as Subjects must obey.
In splendid Domes of State I mostly dwell,
Nor scorn the Meanness of an humble Cell.
I often rule the Politician's Breast,
And mount the Pulpit with the pamper'd Priest:
I over dwell with Fools in grave Disguise,
And check the Blockhead that wou'd seem too wise:
In Senate-Houses, where the Learn'd shou'd be;
One half of their Debates belong to me.
Did I not Scope for Conversation make,
Our Belles and Beaux must some new Method take:
The Prude wou'd want her dear-affected Drawl,
And the Coquet scarce move her Lips at all;
The studious Fop wou'd lose his Power to please,
And speak his Thoughts with no becoming Ease.

I fur-

I furnish Matter to prolong Disputes,
Else half of human Species had been Mutes.
From me more latent Intricacies flow,
Than *Euclid*'s Elements or Tracts of Law.
My Depths, yet unexplor'd, are so profound
That Sense, bewilder'd in the Search, is drown'd.
To me the learned Sophs must ever yield,
And Logic quit the undisputed Field;
My Arguments admit of no Reply,
What I assert Logicians can't deny.
With deepest Learning I can hold Dispute,
Confute, change Sides, and changing still confute.
Ye *British* Wits, my greatest Foes, reveal
What I, in vain, endeavour to conceal:
To you, and you alone, I must appeal.

(4.) ÆNIGMA 48. by Mr. *William Heaford*.

Ye Gentlemen! that do delight to trace
The obscure Steps of Ænigmatic Race,
Your Audience and Attention I implore;
As one that never grac'd your Rhymes before.
When I at first was fram'd, I was design'd
For the Delight and Profit of Mankind;
And to that End am hurried up and down
To many a Village and each Market Town,
Nay, Countries that are distant far from Home;
Oblig'd to shew my Pass where'er I come.
My Character has gain'd such great Report,
That Numbers my Acquaintance daily court.
My Age not half a Score, yet I may say
Astronomy I do profess each Day:
In Mathematics too I greatly deal;
And many hidden Mysteries reveal.
'Tis I foretel you Things that happen true,
Yet ne'er the Art of Necromancy knew.
Your leisure Hours I often crown with Mirth,
And Poetry I challenge from my Birth.
I to the Subjects certain Profit bring,
Likewise a Revenue unto the King:
But after I one Year (deny't who can)
Have serv'd that frail ungrateful Creature Man,
I'm laid aside, and never am no more
In half so great Esteem I was before.

(5.) ÆNIG-

(5.) ÆNIGMA 49. by Mr. *Ralph Hulſe*.

Ye curious Artiſts liſten to my Theme,
Exert your Skill, and try to ſolve my Name:
For I'd a *Being* 'fore the World was made,
And ſince well fix'd, of ending not afraid.
A *Being* did I ſay, I ne'er had *one*,
Tho' to all *Subſtantives*, gave Birth ('tis known)
As Sages ſing.—When Time and Place was not,
By ſtrict Command I *ſomething* ſtraight begot;
Something, the choiceſt Attribute of all,
Sever'd from me her grand Original;
And from a pow'rful tho' an empty Hand,
Snatch'd Men, and Brutes, Fire, Water, Air, and Land:
Proliſic Matter flew from my Embrace,
And Light Ætherial veil'd my duſky Face;
And, tho' diſcover'd not by mortal Eyes,
The great All-Wiſe into my Boſom pries;
Where ſecret Truth, and inward Reaſon lies.
I preſent am with Idiots in Diſguiſe,
And wiſe Projectors teach what to deviſe,
With panic Fear the ſilly Cow'rd confound;
Whilſt the brave Hero boldly ſtands his Ground:
In fine——Grand Promiſes before me bend,
And in me ever flow, and ever end;
But hold, no longer puzzle, Sirs, your Brains,
Ye may by reading find me for your Pains.

(6.) ÆNIGMA 50. by Mr. *James Mayo*.

Ye Sons of Art and Wit, who grace our Age,
May Heav'n preſerve you from my direful Rage:
For thoſe who oft my odious Feats have penn'd
Make me as dreadful as the fouleſt Fiend.
For Men to ſhun my Wrath too frequently
Commit Offences of the deepeſt Dye:
Tho' ſome to gain me, where I was a Stranger,
Loſe Health and Wealth, nay Life and Soul endanger:
Then theſe capricious Men unwelcome make me;
And wiſh for Death perhaps 'cauſe they'd forſake me:
Or rather than they will themſelves reſign,
Adraſtia's Rage perhaps prefer to mine.
But theſe are Actions of the ſordid Slave,
I'm not ſo ſlighted by the truly Brave.

Wiſdom

Wiſdom and Gravity may be content
With me as well as my great Opponent:
For *Job* did make me no unwelcome Gueſt,
Nor *Solomon* my Oppoſite requeſt:
But yet that I may abſent from you be,
I'd you adviſe to live abſtemiouſly:
Aud humbly crave that in your Works of Fame
You, at your Leiſure, will inſert my Name.

(7.) ÆNIGMA 51. by Mr. *Edward Laſhmore*,

I, like a ſtubborn Son or greedy Heir,
Requite thoſe ill who once of me took Care.
When come to Age, ſo ſplendid is my State,
That Numbers of Attendants on me wait;
When I command both great and ſmall obey,
And where I ſend 'em go by Night, or Day:
But, to my Shame, it truly may be ſaid,
That for their Service they are badly paid;
For ſuch my Nature, ſuch my Cruelty,
I baniſh thoſe that moſt obedient be.
But, tho' my Power's as great as I've expreſt,
I rule not all; for, it muſt be confeſt,
As Lords of State one Maſter own; ſo I,
(That Thouſands do command) I'm govern'd by ——
One who's afraid of me: Nay, I declare,
'Tis I that often make my Maker fear.
And (tho' theſe Things are ſtrange) what's ſtranger ſtill,
I make the Dead to fly, the Living kill.
But leſt I ſhou'd be proud, and proudly boaſt,
My meaneſt Servants ſometimes rule the Roaſt.

An *Alphabetical Catalogue* of CONTRIBUTORS to this Diary, ſhewing by the Numerical Letters, i, ii, iii, *&c.* which Queſtions; and by 1, 2, 3, 4, *&c.* what Ænigmas each anſwered.

Mr. *Tho. Allen*, all but firſt. Ecl. and Par. Capt. *Buſtle*, all Æ. in Verſe. And 2d Par. *E. B.* all Æ. in Verſe. Mr. *Tho. Bird*, all Æ in Verſe. Mr. *John Bevil* all Æ. in Verſe. Mr. *Sam. Bamfield* all Æ. in Verſe. Mr. *Will. Bevil* ii. iii. iv. viii. and all Æ. in Verſe. Mr. *John Brown* all Æ. 2 Par, and Eclipſes. *St. Chad*, all in Verſe. Mr. *Edward Croſs*, iii. v. vii. Mr. *John Cotton* ix. 4. 5. 7. and 2. Par. Mr. *John Cheſter*, all but 7. Mr. *Tho. Cowper* iii. v. vii. viii. ix. all Æ. 2d Par.

Par. and Ecl. Mr. *George Dennis*, iii. v. all Æ. 2d. Par. Mr. *Tho. Dodd* i. iii. v. Æ. all in Verſe. Ech. and a new Epact. Mr. *Peter Door*, all in Verſe, and Sun's Eclipſe. Mr. *William Dyke* all in Verſe. Mr. *James Elgar* iii. v. vii. Par. and Ecl. Pro. Par. S. F. all in Verſe. Mr. *William Foxton* all in Verſe and Ecl. Mr. *Tho. Garrard* ii. iii. v. Mr. *Tho. Grimes* i. v. all but 1. and 2. Mr. *James Hall*, all in Verſe, 2d. Par. Prop. 1. Lat. and 1 Engl. Æ. Mr. *Tho. Harbridge* Sun's Eclipſe. Mr. *John Harvey* all Æ. Ecl. and Par. Mr. *William Heaford* all in Verſe and Par. Mr. *Jonathan Hobſon* ii. all Æ. but 1. and 6. and Par. Mr. *J. Hollingworth* ii. vi. all Æ. but 6. and Eclipſes. Mr. *Ralph Hulſe* all Æ. in Verſe, and all Ecl. Prop. 2. Æ. Mr. *Samuel Hammond* all Æ. and 2. Par. Mr. *John Hammond* all Æ. Mr. *Geo. Harwood* all in Verſe. Mr. *Stephen Hubbard* all in Verſe. and both Par. Mr. *David Harris* all Æ. in Verſe. Mr. *Luke Hogard* all but 4. and 5. *Chagfordian Bill* all in Verſe. Mr. *John James* all but 6. and Ecl. Mr. *William Jepſon* ii. ix. all Æ. in Verſe, and both Par. Mr. *Geo. Innes* all Æ. *Jobbernowle* all Æ. in Verſe. Mr. *William Kingſtone* all Queſt. but iv. and x. all Æ. but 6. and both Par. Mr. *Edward Laſhmar* all Æ. in Verſe, and 2d Par. Mr. *James Mayo* all Æ. in Verſe, 2d. Par. Mr. *William Mobbs* all Æ. in Verſe, 2d. Par. and Eclipſe. Mr. *Tho. Moſs* all Queſt. but ix. Mr. *Ant. Moor* 1. 4. 5. 6. 7. Mr. *Nic. Oats* all but x. Mr. *Richard Powel* i. all Æ. in Verſe. Prop. Par. Mr. *William Pommels* all Æ. in Verſe and Pars. Mr. *Joſ. Pilgrim* Eclipſes. Mr. *Rich. Pickburn* all Æ. and 2d. Par. *Don Quixote* all Æ. in Verſe and 2d Par. *Molly Reſtleſs* all Æ. in Verſe. *Ruſticus* all Æ. in Verſe. Mr. *Garſtone Reiford* iv. v. vi. x. Mr. *Robert Robinſon* all Qu. and all Æ. Eclipſes and Par. Mr. *Charles Smith* ii. iii. v. vi. vii. viii. Mr. *Will. Sutton*, all Qu. and Sun's Ecl. Mr. *John Skoy*, Sun's Eclipſe. *The Proud Salopian* all Æ. in Verſe. Mr. *Sam. Setter* Ecl. Mr. *Geo. Stapley* vi. vii. viii. Mr. *Tho. Sparrow* all Æ. and Eclipſes. Mr. *Paul Sharp* vi. vii. viii. ix. x. and all Æ. Mr. *Tho. Smith* all Æ. in Verſe. Mr. *John Turner*, all but i. and iv. and Sun's Eclipſe. Mr. *H. Thorndon*, corrected Intereſt Table. Mr. *James Terey* ix. Mr. *John Thorp* all Æ. in Verſe. Mr. *James Viger* vi. and 2d. Par. Mr. *Joſ. Walker* iii. v. all Æ. in Ver. and Ecl. Mr. *John Williams*, jun. all Æ. in Ver. 2d Par. and Sun's Ecl. Mr. *Rob. Williams* i. ii. iii. v. vii. viii. ix.

N. B. We received very accurate Solutions to moſt of the Queſtions from Mr. *Nicholas Oats*, and Mr. *Rob. Williams*, but their Letters, and Mr. *John Comper*'s Jun. did not come to Hand till after the Anſwers at large were inſerted. Mr. *Paul Sharp*'s and Mr. *John William*'s laſt Year's Contributions never came to Hand.

FINIS.